EXHIBIT I

THIS EXHIBIT CONTAINS CONFIDENTIAL OR RESTRICTED CONFIDENTIAL INFORMATION AND HAS BEEN SERVED VIA EMAIL.

UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF NEW JERSEY
CAMDEN VICINAGE

IN RE: VALSARTAN, LOSARTAN AND IRBESARTAN PRODUCTS LIABILITY LITIGATION	)	MDL NO. 2875
THIS DOCUMENT RELATES TO:	)	HON. ROBERT B. KUGLER
ALL ACTIONS	)	

Tuesday, October 5, 2021

CONFIDENTIAL INFORMATION
SUBJECT TO PROTECTIVE ORDER

Remote Video-Recorded Oral Deposition of GEORGE JOHNSON, Ph.D., VOLUME 2, held at the location of the witness commencing at 9:14 a.m. BST on the above date, before Michael E. Miller, Fellow of the Academy of Professional Reporters, Certified Court Reporter, Registered Diplomate Reporter, Certified Realtime Reporter, and New Jersey Certified Court Reporter No. 30XI00242200.

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GEORGE JOHNSON, Ph.D.

October 5, 2021

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P R O C E E D I N G S

October 5, 2021, 9:14 a.m. BST

THE VIDEOGRAPHER: This is the continued deposition of Dr. George Johnson. Today's date is October the 5th, 2021, and the time is 9:14 a.m.

GEORGE JOHNSON, Ph.D., having been previously duly sworn, testified as follows:

EXAMINATION

BY MS. BOGDAN:

Q. Good morning.

A. Good morning.

Q. Earlier here than there, but...

MS. BOGDAN: Could we please pull up exhibit Technical Fact Sheet NDMA, EPA.

(Whereupon, Deposition Exhibit

Johnson-24, Technical Fact Sheet – N-Nitroso-dimethylamine (NDMA) November 2017, was marked for identification.)

THE STENOGRAPHER: And we start with 24 today.

THE WITNESS: Excellent. It's yet to arrive.

(Technical comments off the stenographic record.)

TRIAL TECHNICIAN: And yes, this is in as Exhibit 24.

BY MS. BOGDAN:

Q. And can you see that, Dr. Johnson?

A. I can. It's just loading. I can see it now, thank you.

Q. Have you seen this document before?

A. I may have seen it. I can't recall.

Q. Did you review information from the United States Environmental Protection Agency as part of your work on this case?

A. Not in depth. It wasn't entirely applicable to this scenario in my perspective.

Q. Do you know if NDMA is used for commercial purposes in the United States as of now?

A. I don't. I don't know.

Q. Directing your attention to "What is NDMA" on this exhibit, the second bullet point down.

A. Second bullet point, yeah, I can see that.

Q. Okay. And that statement reads: NDMA is not currently produced in pure form or commercially used in the United States, except for research purposes.

A. I can see that.

Q. Okay. Is that statement on this EPA document surprising to you?

A. That is not surprising to me, considering it's around in pure form.

Q. It's around in pure form? Expand on what you mean by that.

A. In pure form, to me, you

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produce it by a company such as Sigma for research purposes. In unpure form, NDMA is produced in many other scenarios, including beer, bacon and so on.

Q. Do you know what it is used for as far as research purposes, how NDMA is used for research?

A. As a genetic toxicologist, I'm aware that it's used for -- it can be used for research if people are looking at the genetic toxicology profile of NDMA.

Q. Are you aware that it is used as a cancer initiator in laboratory animals?

A. I'm aware that there's studies that show that cancer at certain doses is produced in the laboratory animals.

Q. And similarly for NDEA, are you aware that NDEA is used in research purposes to initiate cancer in laboratory animals?

A. I'm aware that NDEA has been used to show dose-response information using the cancer bioassay as evidenced in my report as well.

Q. And when you say has been --

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NDEA has been used to show dose-response information in the cancer bioassay, that would be NDMA -- NDEA has been used in research to cause cancer in laboratory animals, correct?

A. Yes, as evidenced -- yes, I did say in the Peto study that shows NDEA induces cancer at certain concentrations in the rodent cancer bioassay.

Q. Thank you.

MS. BOGDAN: If we could please pull up IRIS Nitrosodimethylamine; CASRN 62-75-9.

(Whereupon, Deposition Exhibit Johnson-25, IRIS Chemical Assessment Summary, N-Nitrosodimethylamine; CASRN 62-75-9, was marked for identification.)

A. It would appear as Exhibit 25?

MS. BOGDAN: It should.

THE WITNESS: Thank you.

TRIAL TECHNICIAN: Is that the correct document?

MS. BOGDAN: Yes, it is.

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TRIAL TECHNICIAN: Thank you.

THE WITNESS: Not yet. Apologies. It's appeared. It's loading. It's on my screen.

BY MS. BOGDAN:

Q. And, Dr. Johnson, have you seen this exhibit before?

(Interruption off the record.)

MS. BOGDAN: I'm not sure what's going on in the room, but it's --

MS. LOCKARD: We got a prank call. We'll proceed. Let's proceed.

THE WITNESS: I remember the question. I can answer the question.

A. I cannot recall seeing this document.

BY MS. BOGDAN:

Q. Are you familiar with the Integrated Risk Information System for the U.S. Environmental Protection Agency?

A. I am aware of the Integrated Risk Information System, IRIS, of the EPA.

Q. Okay. If you could please turn

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to the second page of the document.

A. I'm on the second page of the document.

Q. You said you have not seen this before?

A. I can't recall -- (audio malfunction) --

(Clarification requested by the stenographer.)

A. I cannot recall seeing this before.

BY MS. BOGDAN:

Q. Does the EPA use a linear low-dose extrapolation for risk assessment related to NDMA?

MS. LOCKARD: Objection, form, speculation.

A. I cannot recall their assessment.

BY MS. BOGDAN:

Q. Directing your attention to the second section, Carcinogenicity Assessment for Lifetime Exposure.

Do you see that section?

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A. I see that section.
Q. And do you see the sentence in the paragraph that begins: The slope factor is the result of application of a low-dose extrapolation procedure?
A. I do see that.
Q. Does it appear from this document that the USEPA uses a linear low-dose extrapolation method for assessing the carcinogenicity of NDMA?
MS. LOCKARD: Objection, form, speculation.
A. I do see that that's presented in this document from the EPA, and it does not change my opinion as presented in my report.
BY MS. BOGDAN:
Q. I didn't ask -- I was asking if the U.S. Environmental Protection Agency uses a low-dose linear extrapolation to determine the carcinogenicity of NDMA and whether this document indicates that.
Do you see that presented in this document?

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MS. LOCKARD: Objection, vague.
A. I see in this document they use a slope factor and a linear low-dose assessment to calculate these different cancer risks, and it does not change my opinion in my report.
BY MS. BOGDAN:
Q. Going down a little further on the same page, do you see the Weight-of-Evidence Characterization section?
A. Yes, I do.
Q. And how is NDMA classified?
A. It is classified B2, probable human carcinogen.
Q. Thank you.
A. In this document.
MS. BOGDAN: If we could please pull the next exhibit, which is N-nitrosodiethylamine. Again, an Integrated Risk Information System, IRS [sic] document, CASRN 55-18-5.
(Whereupon, Deposition Exhibit Johnson-26, IRIS Chemical Assessment Summary, N-Nitrosodiethylamine; CASRN 55-18-5, was marked for identification.)

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THE WITNESS: Firstly, I would like to, just on record, record the date of the document you've showed me. It looks to be 1987. Okay.
MS. BOGDAN: As far as the last revision, yes.
THE WITNESS: Yes.
MS. BOGDAN: Has the next exhibit loaded?
THE WITNESS: Would this be 26?
MS. BOGDAN: I believe so.
THE WITNESS: It has loaded. I've clicked on it. It's in front of me.
BY MS. BOGDAN:
Q. All right. And this is a similar Integrated Risk Information System document, but this one pertains to N-nitrosodiethylamine.
Do you see that at the top?
A. I do see that from this 1987 document.

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Q. I'm directing your attention, again, to Section II on page 2, which is the Carcinogenicity Assessment for Lifetime Exposure.
A. I can see that.
Q. And similarly in that descriptive paragraph, it reads: The slope factor is the result of application of a low-dose extrapolation procedure.
Do you see that?
A. I do see that.
Q. Does this document indicate that the EPA uses a low-dose linear extrapolation to determine the carcinogenicity assessment for NDEA?
MS. LOCKARD: Objection, form, speculation.
A. I agree that they used this linear back-extrapolation for NDEA in 1987 from the EPA, prior to the Peto study.
BY MS. BOGDAN:
Q. And directing your attention to Section II.A, Evidence For Human Carcinogenicity and the Weight-of-Evidence

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Characterization. How is NDEA classified in this document?
A. NDEA is classified in this document with this hazard classification of being a B2, probable human carcinogen, in 1987.
Q. And you say in 1987. Have you checked the Integrated Risk Information System to see if or how NDMA and NDEA are currently classified?
A. I have not. I'm commenting on what I'm seeing here.
Q. And when you say commenting, you're commenting regarding the last revision that's noted on page 1 of the document?
A. With regards to the date, was that the question?
Q. Yes.
A. This is -- yes, I'm commenting that this date presented here is the correct date where this is presented first online, 31st of the 1st, 1987, is the comment that I'm making on this date.
Q. And then it also indicates

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right in that -- under that first online date that the last time it was revised was January 31st, 1987.
Do you see that over on the right side of the page?
A. I see that on the right-hand side of the page.
Q. Do you have any reason to believe that this is not the current assessment of the Integrated Risk Information System with regard to NDEA?
A. I am not aware, and I'm commenting on the document put in front of me here.
Q. Thank you.
MS. BOGDAN: If we could pull up the next exhibit, which is Control of Nitrosamine Impurities in Human Drugs.
(Whereupon, Deposition Exhibit Johnson-27, Control of Nitrosamine Impurities in Human Drugs Guidance for Industry, was marked for identification.)

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THE STENOGRAPHER: Exhibit 27.
THE WITNESS: Not there yet for me.
It's there for me. I can see it on my screen.
BY MS. BOGDAN:
Q. Okay. Are you familiar with this document?
A. I am not aware. I cannot recall.
Q. And when is this document dated?
A. This document on the first page is dated February 2021.
Q. Did you research the guidance that the U.S. Department of Health and Human Services, the Food and Drug Administration, otherwise known as the FDA?
A. I did research the numerous documents on this evolving case from the FDA.
Q. And is this one of the documents that you discovered and reviewed?
A. I think so.
Q. But you're not certain of that?

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A. I have read a huge amount of FDA documents on this topic, and I think -- I think that this is one of them.
Q. If we could go to page 5. And it may not be page 5 of the PDF, but be page 5 of the document as numbered.
A. Could you indicate the first line of that page, just so I can find it, please.
Q. It should begin "Nitrosamine compounds are."
A. Excellent. I'm on the page.
Q. Would you please read the first sentence.
A. Nitrosamine compounds are potent genotoxic agents in several animal species and some are classified as probable or possible human carcinogens by the International Agency for Research on Cancer, IARC. And then citation 18.
Q. Do you know how many animal species have been shown to develop cancer when administered NDMA?
A. In robust studies, as would be

used for my risk assessment that would be available on the cancer potency database, there was rat, mice and rhesus monkeys, and those were the robust ones in line with OECD guidelines that could be used for this risk assessment. And those would be the ones I would comment on.

Q. Did you look for other animal species other than the rat, mice and I believe you said rhesus monkeys?

A. I looked at those datasets on the cancer potency database, and during one of my readings of another expert witness' deposition, there was discussion -- actually, in their expert report, I think, they discussed in depth multiple animals, multiple animal studies where they stated cancer had been shown, and in that regard, I looked into those and did an assessment of study design, the date tested, route of administration, seeing if they were correct, and I did not confirm that those multiples suggested by -- in that report showed convincingly that there was cancer, particularly cancer related to

the doses we're seeing here.

So that would be my comment on those.

Q. In your research, did you note or find any study that showed any type of animal was resistant to developing cancer from NDMA when administered NDMA?

A. From my understanding of your term "resistant," I would talk about dose where a resistance to the substances would be through DNA repair, specifically MGMT. So if there were doses where cancer was not seen, such as in the Peto study, then that would support resistance at certain concentrations of NDMA and NDEA.

So I was aware of that.

Q. And are you aware of any study where NDMA was administered at high doses where the animal was resistant or did not develop cancer?

A. In high doses, such as the Peto study, with increased dose, there were increased levels of cancer in that cancer bioassay study, for example.

Q. And the Peto study studied both NDMA and NDEA, correct?

A. Both the NDMA and NDEA in the Peto study showed a dose response in the cancer bioassay for both substances.

Q. And when you say dose response, does that mean that the more of the substance that was administered, either NDMA or NDEA, the more cancer was seen, the more incidence of cancer was seen?

A. With a dose response at certain levels in a nonlinear manner, I did see an increase in cancer with increasing dose at certain concentrations, but I did not see that in a linear fashion.

BY MS. BOGDAN:

Q. Directing your attention back to the exhibit, do you see the sentence that begins in that first paragraph "The guidance recommends"?

A. Are we on the same page, starting "Nitrosamine compounds"?

Q. Yep. It's the third sentence in the first paragraph. It begins "The

guidance recommends"?

A. Excellent. I see that.

Q. Okay. Could you please read that sentence?

A. The sentence reads: The guidance recommends control of any known mutagenic carcinogen such as nitroso-compounds, at or below a level such that there would be a negligible human cancer risk associated with the exposure to potentially mutagenic impurities.

Q. And you agree that there should be control of any known mutagenic carcinogens such as nitroso compounds at or below a level such that there would be a negligible human cancer risk?

MS. LOCKARD: Objection, form.

A. I agree with this statement. I also point towards another option within the M7 guidance to calculate and to abide to this sentence in a different way; if we have an understanding of DNA repair, then we can use the PDE approach.

So I abide to this, agree that

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this is what we could do, and my approach is also in support of this approach. And I can justify it through the mutagenic mechanism of action for dose response, and the threshold mechanism being DNA repair. And this is entirely in line with this same document as cited here, M7.

Q. However, your approach is not the one that has been adopted by the FDA, correct, in establishing the limits for NDMA and NDEA?

A. At the current time, that is correct.

Q. If we could move to page 10 of the document, please.

A. I'm on page 10. There's a table -- Table 1 at the top. I'm on that page, Acceptable Intake Limits; is that correct?

Q. Yes, it is. I think for the people on Zoom, we need to have it moved up a little bit.

And do you see Acceptable Intake Limits on the top of this page?

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A. I do see that.

Q. Okay. And then there's a table that has the acceptable limits for NDMA, NDEA and some other N-nitroso compounds?

A. I do see that.

Q. Okay. And what are the acceptable intake limits according to the FDA for NDMA?

A. Well, NDMA, the FDA calculated limits using a TD50 linear back-extrapolation to 1 in 100,000 people based on this animal study is 96 nanograms per day.

Q. And that's reflected in Table 1?

A. That is reflected in Table 1. It's the top row.

Q. And what is the acceptable intake limit established by the FDA for NDEA?

A. For NDEA, using a linear back-extrapolation from the harmonic mean of the TD50 to 1-in-100,000 cancer risk after 70 years of exposure, same as with NDMA, after 70 years of exposure, the acceptable intake is 26.5 nanograms per day.

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Q. And that's the acceptable intake limit established by the FDA, correct?

A. That is the acceptable intake limit as established by the FDA using this calculation for 70 years of exposure to 1-in-100,000 cancer risk, according to this legend.

Q. And if we could please move to Appendix B of this exhibit.

THE STENOGRAPHER: B, bravo?

MS. BOGDAN: Yeah, it would be the very last page.

THE WITNESS: Very last page. What number would that be?

MS. BOGDAN: It actually has a number 1 on it, but it's the very last page of the PDF.

THE WITNESS: So top is Contains Nonbinding Recommendations, Appendix B, FDA Determination. Is that the one?

MS. BOGDAN: Yes.

THE WITNESS: Excellent, I'm on it, thank you.

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BY MS. BOGDAN:

Q. And does this appendix set forth how the FDA calculated the acceptable intake limit for NDMA?

A. I have read that first paragraph in full and see that this explains how the calculation for the acceptable intake based on the linear back-extrapolation to calculate the risk of 1 in 100,000 people for lifetime exposure in a 50-kilogram human is how they calculated those presented acceptable intakes.

Q. That describes generally how they go about doing their calculation, correct?

MS. LOCKARD: Objection, form, vague.

A. That's generally how you calculate, and that's how they calculated this very conservative and imprecise acceptable intake as presented in this document.

BY MS. BOGDAN:

Q. And then under that first

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paragraph, they actually give NDMA as an example?
A. It looks that way.
Q. Okay. And they show in that paragraph how they derived the 96 nanograms per day, correct?
A. They do. They assumed no established threshold mechanism, so no consideration of DNA repair was one of their assumptions. They assumed the level of risk would be 1 in 100,000, considering the background level of this type of cancer would be, say, 1 in 200.
So those assumptions were made, and the calculation did -- was used in order to generate their acceptable intake values, as you've just suggested.
Q. And to do their calculations, the FDA assumed there is no threshold, correct?
A. They -- yeah, as stated here, with no established threshold mechanism, that was one of their assumptions. And this is one of the assumptions that I've been working

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on, and this is one of the assumptions that I've just been commissioned by the European Medicines Agency to look into for a wider breadth of nitrosamines as well.
So I'm a leading expert in this area of threshold mechanisms, and the EMA have commissioned me to look into this further. So I know a lot about this topic, and that was the assumption. There was no established threshold mechanism. And that led, instead of the PDE, to use the acceptable intake. That's why I mentioned that assumption.

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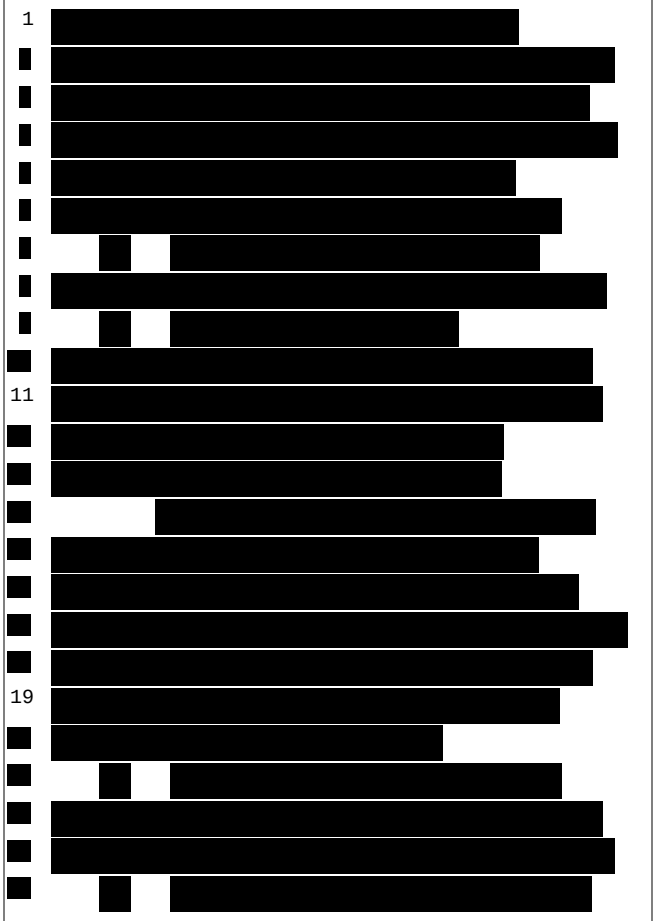

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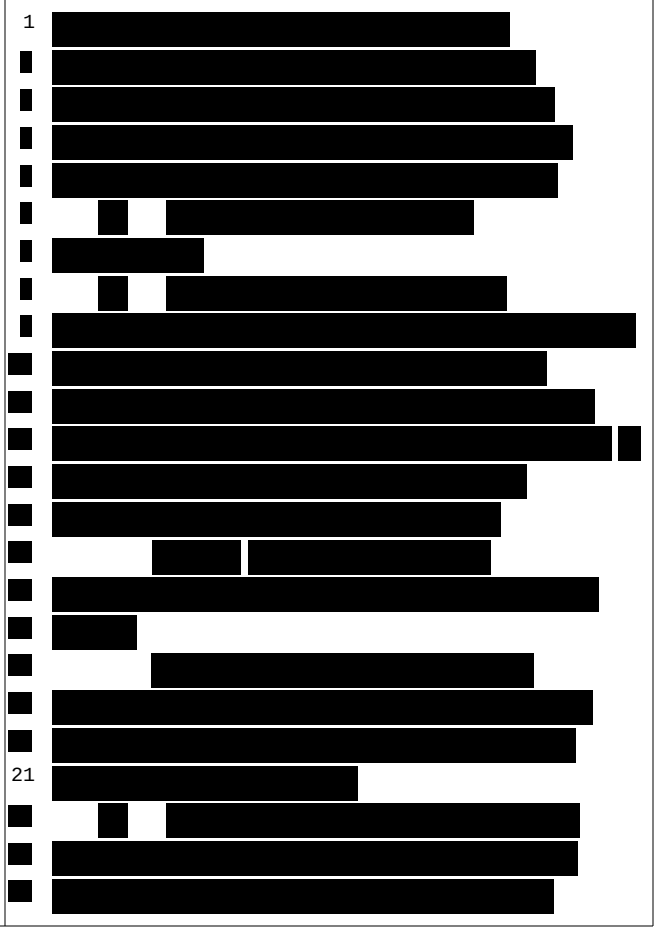

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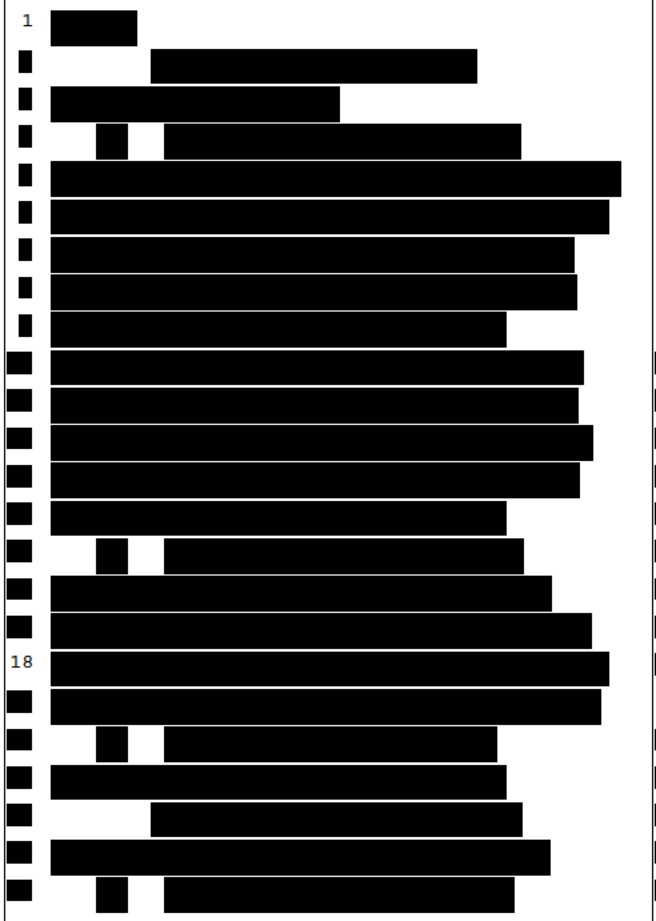

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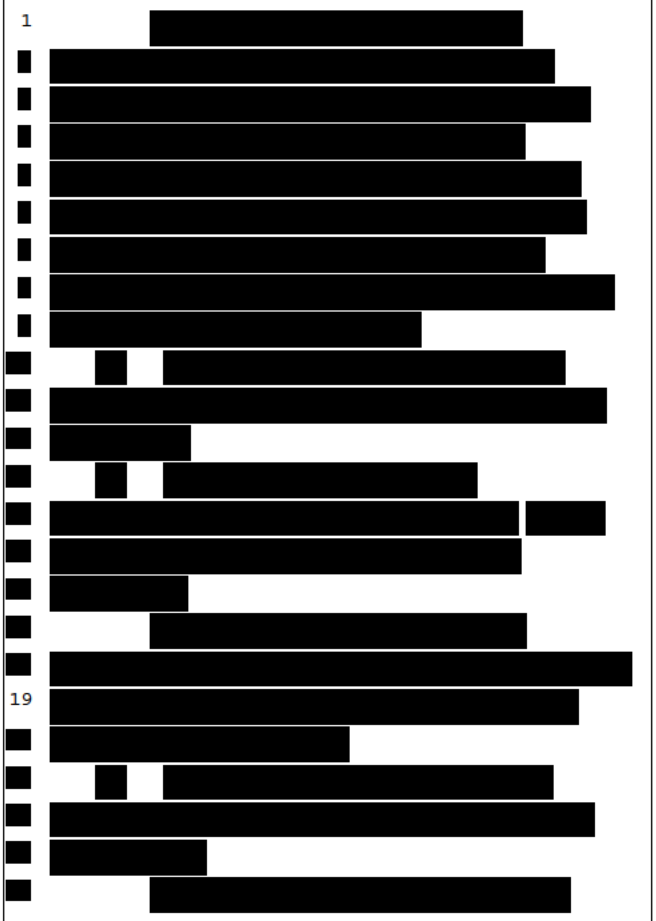

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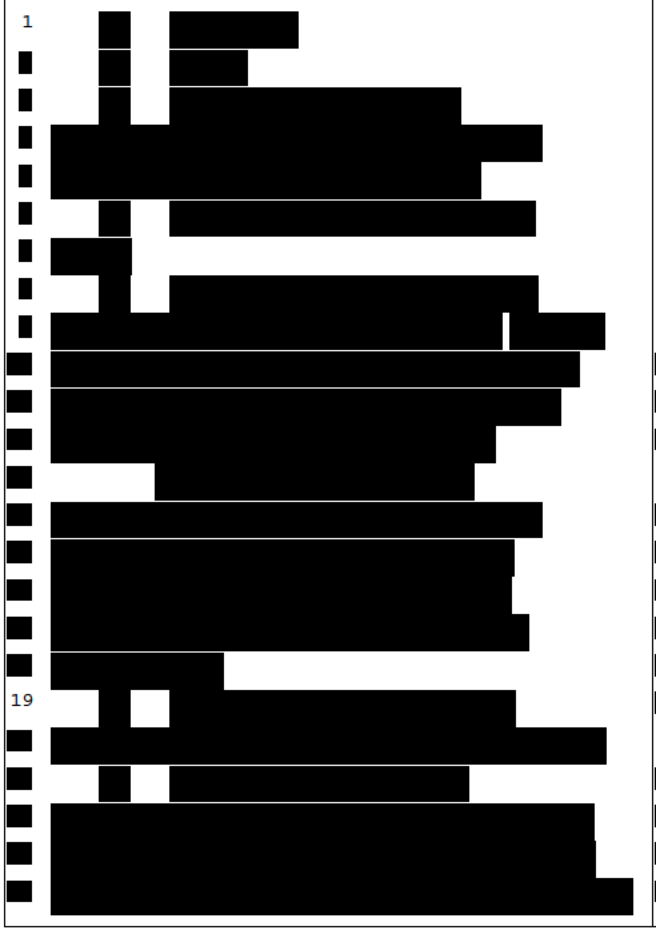

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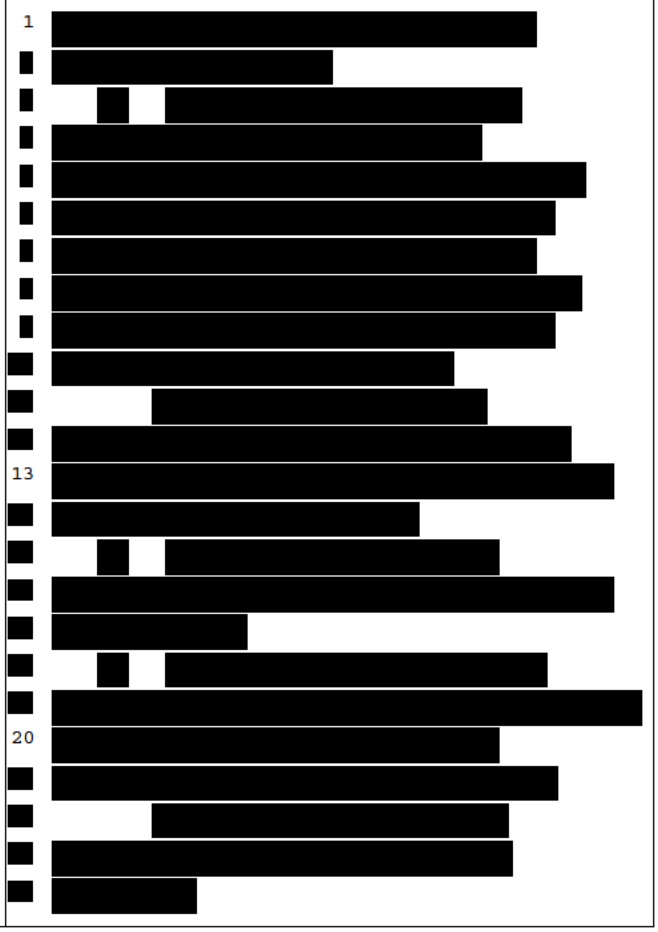

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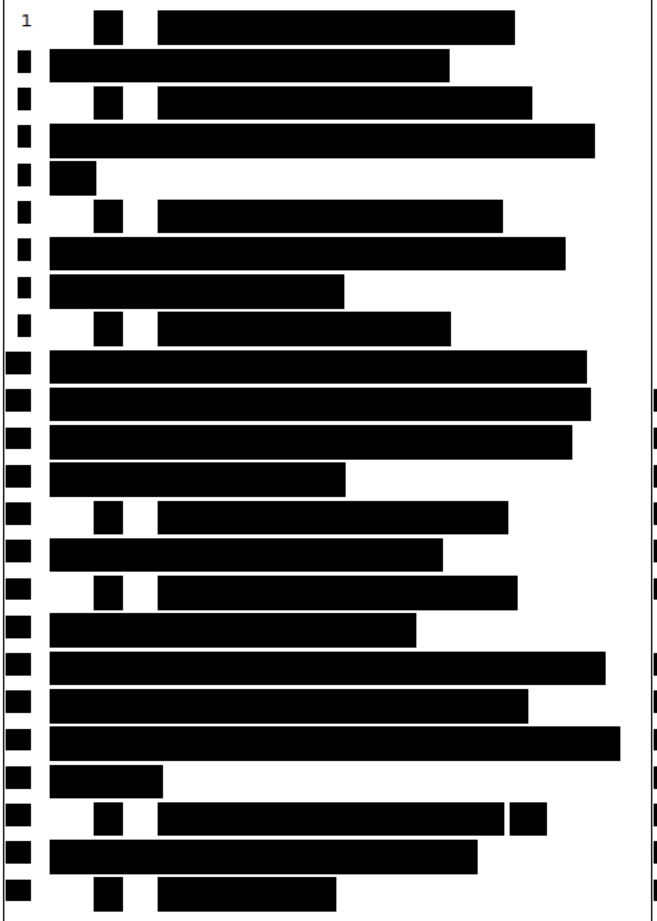

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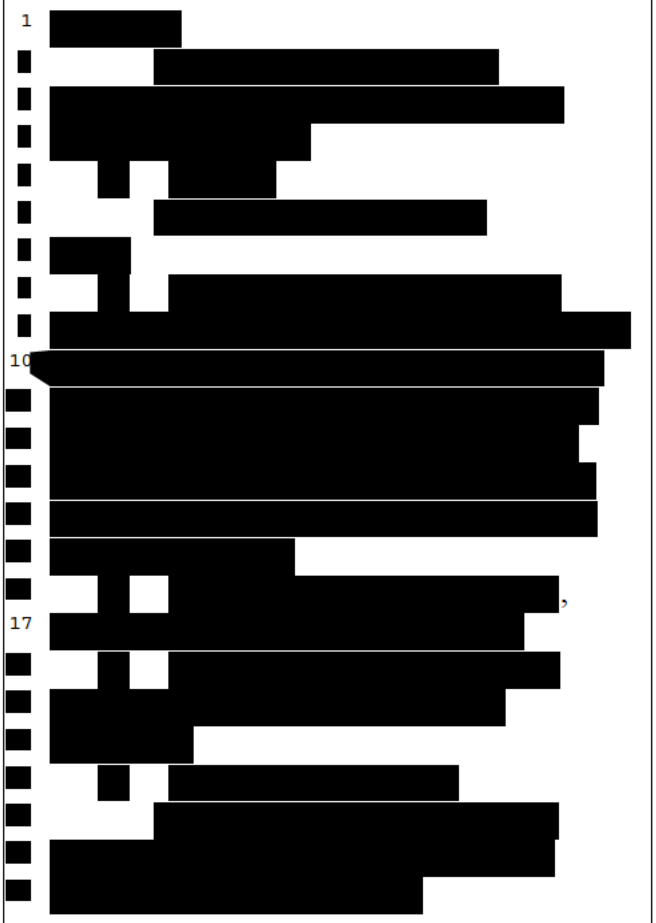

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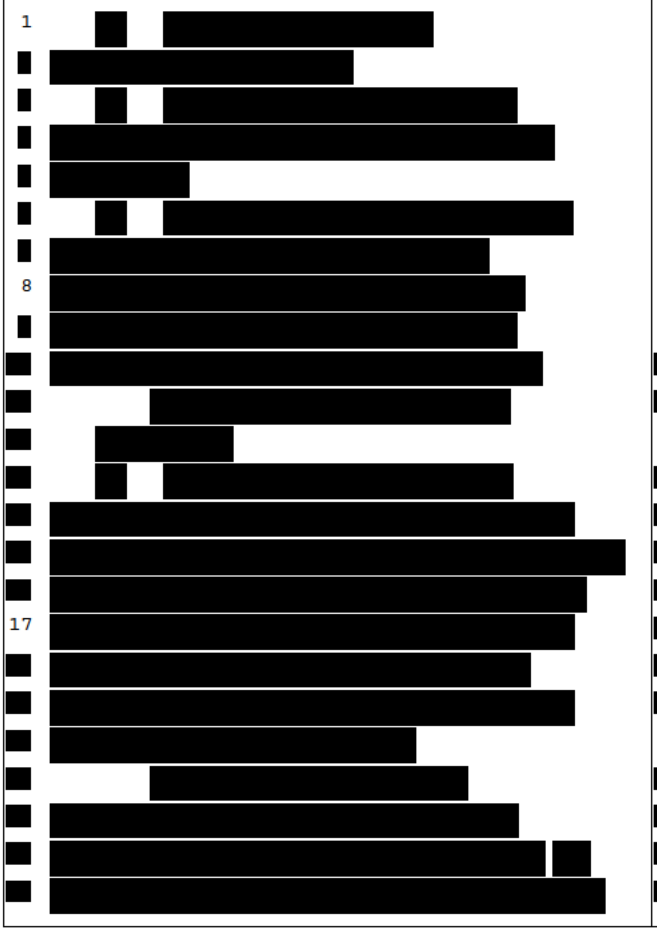

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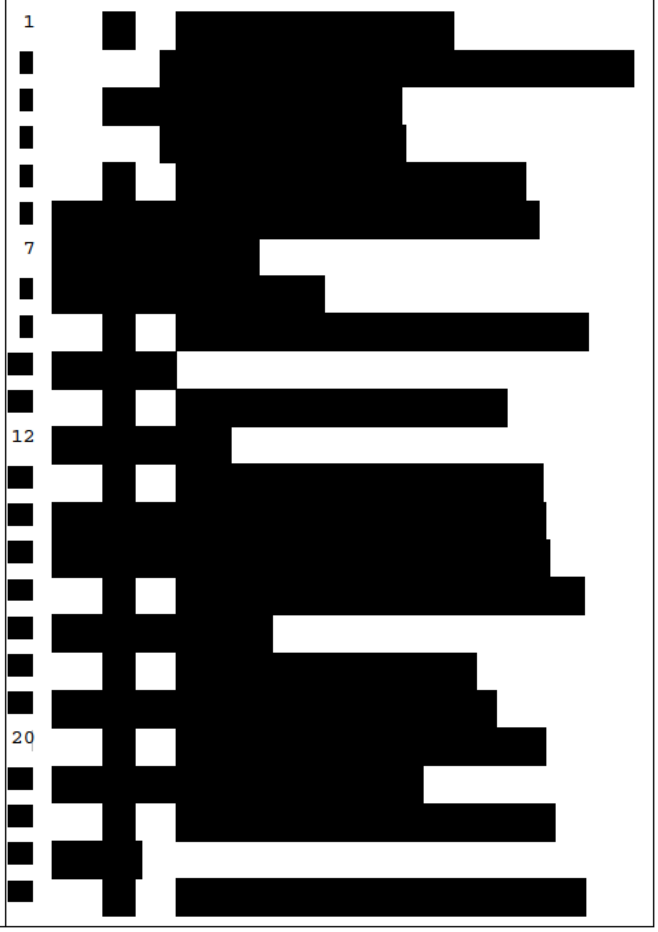


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[redacted]

Q. Did you cite that MNU paper in your report?
A. I'd have to look.
Q. Yes, please.
And who is the first author on

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that paper?
A. Adam Thomas, T-H-O-M-A-S.
Q. When you say Adam, is that the first name and Thomas the last name? Or is Thomas the first name and Adam the last name?
A. Thomas is the last name, and Adam is the first name. It's a strange name. Thank you. Sorry.
Q. No.
If you can't find it easily, what year was it published approximately?
A. It would be easier to find in my CV. Could I have time to look for it in my CV?
Q. Sure, if you can find it in your CV.
MS. LOCKARD: Can I suggest that he look at a footnote, or does that violate your rule? I don't want to impede, but if it would help, I could -- I have an electronic searchable copy, so...
THE WITNESS: Sorry about this.
///

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BY MS. BOGDAN:
Q. On page 7 of your CV, where you have your publications --
A. Yep, I think -- I think, not certain, I think it's the 2013, Influence of DNA Repair on Nonlinear Dose Responses for Mutation, ToxSci. I think that's the one.
Q. Okay. Thank you.
And what is the amount that GSK is paying to fund this research project being done by your postdoc?
A. At an estimate, a postdoc plus full economic costing to cover those aspects I think at 100%. So his wage, 100% to cover all lab space, all that kind of stuff, and lab consumables.
I think the total is approximately 100,000.
Q. Are there any other research projects that are currently underway at Swansea University that would pertain to the issues in this litigation?
A. There would be no additional lab work projects associated with

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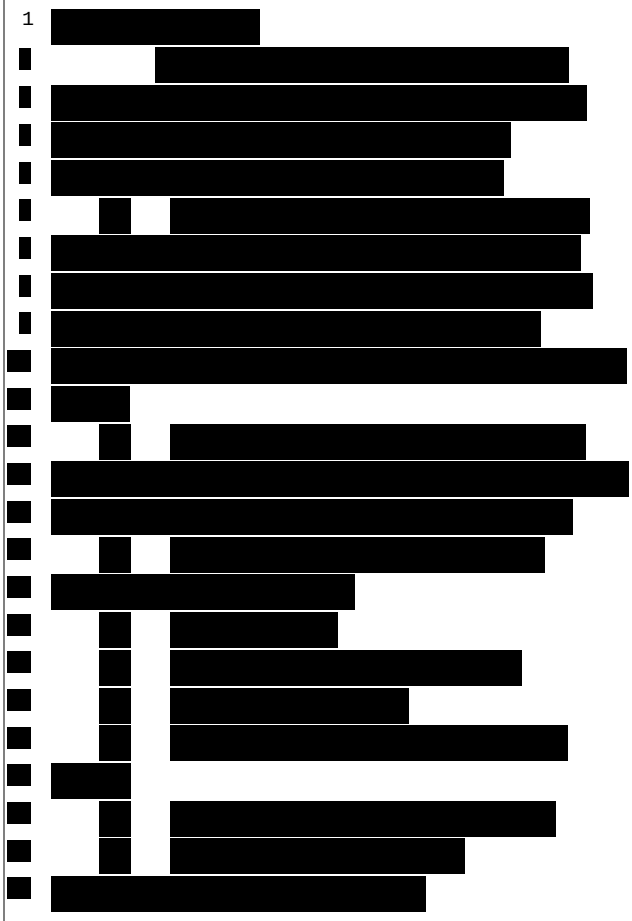
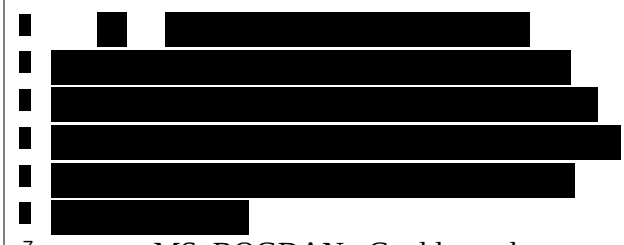
nitrosamines, but I have an ongoing interest in this work and will continue to independently research this topic in a scientific way.
And that would be under university funding and my time allocated to carry out independent research.
Q. And as an assistant professor, is there a certain amount of time that you are allowed to engage in independent research each year?
A. For the record, it's an associate professor.
Q. Oh.
A. So that's the one -- assistant is the one below associate in the U.S. So I'm associate professor.
So the ballpark figure for an academic with ten years such as myself in my university, the ballpark figure is 40% research, 40% teaching, 20% administration. And then as an academic, you end up doing more than that, but that's -- those are the numbers.

Q. Okay.
THE WITNESS: Apologies, can I have a rest break soon?
MS. BOGDAN: Sure.
THE WITNESS: Is it a good time?
MS. BOGDAN: Yeah, we can take one right now if you want to do a quick five-minute break, since I've not started another document.
THE WITNESS: Thank you.
THE VIDEOGRAPHER: Off the record. The time is 10:16 a.m.
(Recess taken, 10:16 a.m. to 10:23 a.m. BST)
THE VIDEOGRAPHER: We're back on the record. The time is 10:23 a.m.
BY MS. BOGDAN:
Q. Are there any other ongoing research projects that you're consulting on that are not being done at Swansea University but somewhere else, pertaining to nitrosamines?
A. Oh. No, there are not.

Q. Has GSK funded postdoc work in your department in the past?
A. Not that I'm aware of.
Q. And how was that particular postdoc student selected to do work on the project?
A. He was selected by myself, and it was an open call for that project for others to apply. He was selected based on his expertise. He's an expert in genetic toxicology. He's carried out research in my laboratory previously. I think he even -- he did carry his Ph.D. out with me as well.
I've worked with him for many years. He's an expert in genetic toxicology. He's a very, very hard worker. I have a lot of time for him. He's perfect for the job, he got the job.
Q. When you say an open call, does that mean that there was like a posting for the position?
A. Yes. Ah. Apologies, no. Apologies. I think in this instance when the person is named in the grant, it doesn't have





MS. BOGDAN: Could we please pull up the next exhibit, which is the February 14th, 2019 EMA assessment report.
(Whereupon, Deposition Exhibit Johnson-28, 2/14/19 EMA Assessment Report, was marked for identification.)
THE STENOGRAPHER: Exhibit 28.
BY MS. BOGDAN:
Q. And please let me know once it's loaded.
A. I will. Apologies for the slow -- we're on Wi-Fi, not wired. It's popped up. It's loading. There we go. I can see it now. I can see it.
Q. Okay. Have you seen this document before?

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A. I think I have seen this document, and I've seen many documents from EMA.
Q. And this document was issued February 14th, 2019 from the face of the document there at the top?
A. According to the details on this document, yes, 14th of February 2019. I can see that.
Q. I'm going to direct your attention to page 17.
A. I'm almost there.
MS. LOCKARD: Page 17 of the PDF or the --
MS. BOGDAN: Page 17 of 41 as numbered on the bottom right-hand side of the document.
THE WITNESS: I have found it, and the first word is-- the first two words are "mean values."
MS. BOGDAN: Correct.
THE WITNESS: I can see that.
BY MS. BOGDAN:
Q. Referring you to Table 3.

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A. Referred.
Q. Yeah. Do you see the -- and what is that table titled?
A. Highest NDMA mean values found in API and FP.
Q. And do you see the values for valsartan API by ZH?
A. I see those, yes. Valsartan API by ZH, valsartan FP containing API by ZH. I see those.
Q. Okay. What is the value indicated under Highest there?
A. For API, Highest states 240. I think that -- is that the microgram value or is that the ppm? Can you correct that for me, just as you may have seen this before?
Q. It -- it indicates on the top of the column headings, it says NDMA ppm, which is also micrograms per gram.
Do you see that on the top?
A. I see that on the top. Thank you for that clarity.
So those values, my -- I prefer working in micrograms per gram -- the highest

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in the API is 240.1, and in the FP, it's 97.4.
Q. So working with the highest number for the valsartan API of 240.1, what would be the total amount of NDMA in a 320-milligram tablet?
A. I do not know the answer because this is the API, and I'm not an expert in formulation for the final product. So that would be an estimation and would not be precise.
Q. Do you know how to take the ppm in valsartan API and convert it to the amount of NDMA that would be in a tablet if that API was used?
A. I do not know that calculation that you've just stated. My focus has always been on the finished product, to which we have these numbers that we can more precisely refer to.
Q. With regard to the highest NDMA ppm found in the finished product on this chart, what is that number?
A. That is 97.4 microgram per

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gram.
Q. If that valsartan finished product was a 320-milligram pill, can you tell me how much NDMA would be in that pill based on the 97.4 NDMA ppm?
MS. LOCKARD: Objection, asked and answered, speculation.
A. From this table, without a calculator, I could not do this for you.
BY MS. BOGDAN:
Q. How would you calculate the amount of NDMA in a 320-milligram tablet using the highest NDMA ppm value shown for the valsartan finished product in the chart?
A. You would correct it -- so instead of being per gram, you correct it to 320 milligrams or .32 grams, and you correct it that way.
Q. And other than that correction, would you do any other calculation with that number?
A. As far as I'm aware, that would not be the case. But I did not do the calculation you're suggesting. As stated in

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my report, I'm going with the finished product as stated in the metrics provided in my report.

Q. Directing your attention further down in this document to the bullet point that begins with 240.1 ppm.

A. I can see that.

Q. Could you please read that -- or those two sentences?

A. Two sentences. The one starting 240.1, those two sentences?

So: 240.1 ppm as the highest NDMA contamination found in ZH API batches, as communicated by ZH. This would result in 76.8 microgram per day in a 320-milligram valsartan tablet.

Q. And how many nanograms would 76.8 micrograms be?

A. Nanograms. So you would multiply that by a thousand.

Q. Okay. So how many nanograms would 76.8 micrograms be?

A. It would be that value multiplied by a thousand.

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Q. Which would be 76,800 nanograms?

A. Yes.

Q. Did you take values such as 76,800 nanograms per tablet into consideration when forming your opinions in this case?

A. My opinions in this case can be explained if we look at my report where the PDE is calculated, and the PDE upper bounds are calculated. My opinions can lie to those calculations.

I adjusted this to the more realistic average population of 100 kilograms for the individuals here. As I would see from average population size, 100 would be closer to the population average, in this case. So I did that calculation in my report.

And also with the smaller population, the adjustment factors could be discussed as going from 50 -- from 500 down to 50 to calculate that PDE and the PDE confidence interval for both 50 and

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100 kilograms.

And from that, with this also recollection and understanding that reducing that uncertainty factor could lead to a tenfold increase in -- order of magnitude increase in the PDEs presented in my report, I could consider that this individual exposed to this would also not have an increased risk of cancer, according to those calculations I've just explained.

So this was not a value included in my report, but seeing this value here, in line with my explanation, I would not see this individual as having an increased risk of cancer, through that explanation.

Q. My question was -- and let me ask it again -- is if in your report you referenced values and considered them that are in the range of 76,800 nanograms per tablet.

A. The -- this document -- is this the EMA one? So this EMA document would relate to the European exposure limits and

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European case, and the numbers within my report relate to the FDA values covering the United States. So far that reason, this value was -- is not included in my report.

Q. Did you look to the values for the NDMA found in the ZHP product that made the U.S.?

A. Can you repeat? I didn't -- I didn't hear if it was the API or the finished product. Apologies.

Q. Did you look to determine the values for the ZHP API that was sold in the U.S.?

A. I looked at the finished product and not the API because the conversion from API to finished product, from my understanding, is -- could potentially be variable, and the extrapolation I would not be comfortable with.

So my work would always be linked to the finished product, which I think is a more reliable metric here for the assessment.

Q. Did you look in the internal

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documents of ZHP to find the highest level of NDMA that was found in the finished tablet?
A. I have seen these documents and have looked at that information, yes.
Q. And what was the highest level of NDMA that you found for a ZHP finished tablet as part of your work on this case?
A. I cannot recall the exact number, but finding out that number did not change my opinion as presented in my report, that those individuals had increased risk of cancer. It did not change it. But I can't recall the exact number.
Q. Can you -- do you recall the general level of that number, meaning was it 20 micrograms, 30 micrograms?
MS. LOCKARD: Objection, vague, asked and answered.
A. I do not know, as previously stated.
BY MS. BOGDAN:
Q. Did you report that highest level of NDMA contamination that you found in your work on this case?

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A. In my work, all of the assumptions within the stated report relate to that FDA table, and then upon reflection of this additional information, I still do not change the conclusion that those individuals have an increased risk of cancer.
MS. BOGDAN: We can take this exhibit down, please.
If we could please pull up the document entitled Calculation of AI Associated with Acceptable Excess Cancer Risk.
(Whereupon, Deposition Exhibit Johnson-29, Demonstrative, Calculation of AI associated with acceptable excess cancer risk - ICH M7, was marked for identification.)
THE STENOGRAPHER: Exhibit 29.
THE WITNESS: It's not there with me yet. Still not there. Maybe it's a large file.
TRIAL TECHNICIAN: I'm just waiting on the number.
THE WITNESS: Still not there.

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TRIAL TECHNICIAN: Rosemarie, I think we're having trouble locating that. What is the -- what's the name of it again? Does it have a -- like a C1 number in front of it?
MS. BOGDAN: It's a PowerPoint slide entitled Calculation of AI Associated With Acceptable Cancer Risk.
TRIAL TECHNICIAN: I think we've got it.
MS. BOGDAN: No, not that one.
TRIAL TECHNICIAN: Not that one.
MS. BOGDAN: But that is one -- there we go.
TRIAL TECHNICIAN: All right. Bear with me one moment. You should see that now.
THE WITNESS: Excellent. It is appearing. I'm loading it. I can see it.
BY MS. BOGDAN:
Q. Okay. Do you recognize this

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PowerPoint slide?
A. I recognize this PowerPoint slide as one that I borrowed from a presentation from Roland Frotschl from -- I think it was a GUM meeting, German mutagenicity meeting, yes.
Q. And what does -- does this slide show the calculation of the acceptable intake risk that was used by the FDA and the EMA to calculate the 96-nanogram-per-day acceptable intake limit for NDMA?
A. Yes, this is a slide from Roland where he shows that. And in my presentations, I show this as -- that acceptable intake as one approach, and then always following on or show the other option within the ICH guidance for the PDE. So just the context as well as the information.
Q. And this is also the methodology that was used by the FDA and EMA to calculate the acceptable intake limit for NDEA?
A. The previous document that you showed me, potentially from FDA which showed

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the calculation, is expanded upon in this slide to make it more exploratory -- no, more explanatory and easier to discuss the linear -- drawing a straight line back from the TD50 to 1-in-100 risk. It's actually 1-in-100 risk in animals. There's no extrapolation factor to humans, and so on. So I present it and critique it as we go through.

Q. My question was: Was this methodology that's shown in this slide also used to calculate the NDEA acceptable intake risk by the FDA and the EMA?

A. This calculation is also used by those regulatory bodies to calculate acceptable intake for NDEA, yes.

Q. Okay. And the -- what is the acceptable daily intake for NDEA as determined by the EMA and the FDA?

A. As you've showed me previously multiple times, that value is 26.5 microgram per day.

Q. Now, referring to this slide, can you read the first sentence on the slide,

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please.

A. The first sentence of the slide, according to Roland Frotschl's slide here, is: Daily intake for lifetime, 70 years, of a mutagenic carcinogen that is considered to be associated with an excess cancer risk of no more than 1 in 100,000 is considered acceptable -- or consider acceptable -- must be a typo -- considered acceptable according to ICH M7.

And then in further slides, I also say acceptable according to ICH M7 is the PDE approach for context.

Q. However, the approach that is shown on this slide, which is followed by the FDA, is acceptable according to ICH M7, correct?

A. That is correct. This approach is also acceptable under ICH M7.

Q. And do you notice the words in this sentence "excess cancer risk"?

A. I do note those, yes.

Q. Okay. And when doing this calculation, it is the intent to limit the

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excess cancer risk to no more than 1 in 100,000, correct?

A. As stated here, that is correct. And that's also the terminology you can use with the PDE calculation as put forward in my document.

Q. And when the FDA is making the determination with regard to the acceptable intake, it is concerned with preventing excess cancer, correct?

A. Correct, according to this slide.

Q. And when they refer to excess cancer risk, they are concerned with preventing additional cases of cancer associated with taking medications with NDMA or NDEA in them, correct?

A. That's part of the explanation. And an additional part would be excess above the background rate in humans. And the actual background rate of humans would be, say, 1 in 2 for general cancer or, say, 1 in 200 for liver cancer. So 1 in 2 for whole cancer, in this term, would actually be

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50,000 out of 100,000. That's the background.

So it's inaccurate in that way, but yes, according to your statement, this does show excess cancer risk is what we're -- what we're assessing for with the AI in NDMA and NDEA.

Q. And do you agree that lowering one's exposure to carcinogens lessens their risk of cancer?

A. It depends on the dose. If you're already at a dose where that compound is not causing any cancer, then it makes no difference, really, if there's a lower level of that compound.

Q. So it's your testimony that lowering a person's exposure to carcinogens does not necessarily lessen their risks of developing cancer?

A. I would state that if the compound is at a level that is not inducing any cancer and you reduce that level of compound even further, then those individuals would not be -- they would also not be at

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increased risk of cancer.
Q. And that's true even if the compound is a known genotoxic mutagen?
A. If the known genotoxic mutagen is not causing any mutation or cancer at the concentration of exposure, and that's reduced, then, again, there would not be an increased level of mutation.
MS. BOGDAN: Could we please pull up the next exhibit, which is the Calculation of Excess Risk for Less Than Lifetime Exposure, M7 TD50 Linear.
(Whereupon, Deposition Exhibit Johnson-30, Demonstrative, Calculation of excess risk for less than lifetime exposure, NDMA average in FP, was marked for identification.)
THE STENOGRAPHER: Exhibit 30.
THE WITNESS: Can I ask, will this be a long one? I need another short break at some time soon.
MS. BOGDAN: If you want to take just a few minutes, we can do

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that. I don't want you to be uncomfortable.
THE WITNESS: That's very much appreciated.
MS. BOGDAN: Okay.
THE VIDEOGRAPHER: Going off the record. The time is 10:54 a.m.
(Recess taken, 10:54 a.m. to 10:57 a.m. BST)
THE VIDEOGRAPHER: Back on the record. The time is 10:57 a.m.
BY MS. BOGDAN:
Q. Can you see Exhibit 30?
A. I can see Exhibit 30.
Q. And do you recognize this slide?
A. I recognize this slide as another part of Roland Frotschl's slide set from that GUM meeting, which I then used to explain how the regulatory bodies calculated these values, and then later critiqued these approaches in this presentation.
So yes, I do know this slide.
Q. But this slide explains how the

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FDA and the EMA calculated these acceptable intake limits, correct?
A. It's correct for EMA, but I'm not comfortable for FDA, where the years taken for the final columns, I -- I recall they could be different. But yes to an extent with the 96 value from the TD50, rat liver tumor harmonic mean, they did a linear back-extrapolation, as stated here by Roland Frotschl and explained by me in this presentation, yes.
Q. And do you see the 2,453-microgram number on that slide?
A. Yes, I see that calculation for if the individual was exposed for the duration of 70 years to the substance, and that would be the total. And that's provided here, yes.
Q. So that would be the total cumulative lifetime exposure if a patient took valsartan every day for 70 years and the tablet had 96 nanograms a day, which is the acceptable intake limit of NDMA, correct?
A. According to this slide that I

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have not changed from Roland Frotschl, that would be correct for NDMA, if take -- I don't agree with the term "cumulative." If all those tablets were together, this would be the value that would be -- of NDMA in the total amount of tablets if taken altogether. I don't agree that it would accumulate, so I don't agree with that term, "cumulative."
Q. The total amount of NDMA that the patient would be exposed to if they took a tablet of valsartan every day for 70 years that had the 96 nanograms per day acceptable intake limit; is that true?
A. According to this calculation presented here by Roland Frotschl, the value -- I have no reason to state that that is an incorrect calculation. So yes, that would be the value in line with your statement.
Q. So the total amount of NDMA to which the patient would be exposed, correct?
A. Yes, if that patient took that particular contaminated drug for 70 years at that level, yes -- yes, according to that

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linear back-extrapolation from the TD50 from liver tumors.

And the whole premise of my work is to put this forward as an unprecise way of doing these calculations following on from this, this amount.

Q. Okay. And in your 2021 research article, you proposed that the appropriate permissible daily exposure for NDMA would be 6,200 nanograms, correct?

A. In that cited publication of myself, based on the assumptions put forward in that table of a 50 gram -- a 50-kilogram population and with those adjustment factors of 500 for the global population, and using the lower bound of the BMD, whereas in this report, where we're applying it to actual dose, we're using the lower and upper bound, which is the more precise and better way for this risk assessment.

But that's what's presented in that publication, 50-kilogram human, BMDL10, and that's the PDE, as you've cited -- as you've cited.

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Q. And if one uses that PDE that is suggested by you in the research article, that the lifetime cumulative -- or let me say it a different way -- the lifetime total exposure would be 1,058,410 micrograms; is that correct?

A. I do not know.

Q. Well, we would arrive at that number by taking the 6.2 micrograms and multiplying that by 365 and by 70 years in order to compare it to the 2,453-microgram total that appears in this slide, correct?

MS. LOCKARD: Objection, convoluted.

A. This is not my calculation, but I have no reason to disagree with your calculation. So I understand.

BY MS. BOGDAN:

Q. The PDE that you have proposed of 6.2 micrograms, what order of magnitude is that higher than the acceptable limit established by the FDA?

MS. LOCKARD: Objection, confusing.

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A. Approximately -- asking me to do calculations without a calculator -- approximately, it looks in the order of magnitude of two orders of magnitude, approximately a hundredfold, as an approximation, potentially incorrect, required to do a calculation in my head under pressure.

BY MS. BOGDAN:

Q. Do you have a calculator available to you?

A. Not that I'm aware of.

MS. GOLDENBERG: Just use the computer.

THE WITNESS: Oh, okay.

MS. LOCKARD: And I'm going to object to him using -- I don't know whose computer this is, but I'm going to object to you having to do mathematical calculations on this person's computer.

THE WITNESS: I do my calculations in Excel.

MS. BOGDAN: Let me ask this

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another way which won't require very difficult math.

THE WITNESS: I'm not saying it's very difficult. I'm just suggesting I don't want it on the record to do a calculation in my head. I don't think it's very difficult, but I would require a calculator in order to do this precisely, and I like precision. Sorry.

BY MS. BOGDAN:

Q. The FDA's acceptable intake limit is 96 nanograms, correct?

MS. LOCKARD: Asked and answered, objection.

MS. BOGDAN: Well, I'm just trying to walk through the calculation.

A. Okay. That is correct.

BY MS. BOGDAN:

Q. And your proposed permissible daily exposure is 6.2 micrograms, correct?

A. The proposed PDE from the lower bound for a 50-gram -- 50-kilogram population

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for a global population using the lower bound, not considering the upper bound as I have in my report, which is what I actually carried the risk assessment out on, but I can acknowledge your calculation, yes.

Q. Well, 6.2 micrograms is what you put in your peer-reviewed published research article, correct?

A. 6.2 is what I put in my peer-reviewed research article as the lower bound with these different assumptions made for a general PDE for a global population and this conceptual report, this research article that is not a risk assessment.

Q. And 6.2 micrograms is 6,200 nanograms, right?

A. Yes.

Q. So we're comparing an acceptable intake as determined by the FDA of 96 nanograms to your permissible daily exposure limit of 6,200 nanograms, correct?

A. That is correct. And the justification and the reason for the difference is the linear back-extrapolation

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does not consider dose response really at all of the cancer bioassay data, and the PDE data does, and it also considers the biology.

And that accounts for the difference as outlined in my publication, in my report, to a high level of depth.

Q. Is 6,200 nanograms approximately 600 times larger than 96 nanograms?

A. I don't want to get this wrong again, so could you say that again, please?

Q. Is 6,200 nanograms approximately 600 times larger than 96 nanograms?

A. Is it more like 60? 60 times a hundred is 6,000.

Again, asking me to do calculations without this calculator is the same issue of estimation, and I don't feel comfortable with estimations of calculations without going to this calculator.

Q. Okay. If we could -- just to follow up on your last answer, so you -- is 6,000 nanograms approximately 60 times larger

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than 100 nanograms?

A. That feels more in line with the correct answer.

Q. Okay. Now, on this slide that's in front of you, there is a theoretical excess lifetime cancer risk calculation that's done.

Do you see that?

A. I see that on this slide from Roland Frotschl. I see that, yes.

Q. And is that theoretical excess lifetime cancer risk calculated assuming a 320-milligram-per-day valsartan contaminated with 24.1 micrograms of NDMA for six years?

A. Yes. From my understanding of this slide, that is what it states.

Q. And what is the theoretical excess lifetime cancer risk associated with taking the 320-milligram-per-day valsartan contaminated with 24.1 micrograms of NDMA for six years?

A. The values stated in this table, in accordance with your statement, are 1 in 4,650 theoretical excess lifetime cancer

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risk from a 320-milligram-per-day valsartan contaminated with 24.1 microgram for six years using this linear back-extrapolation, acceptable intake, which is different to the PDE approach, which my whole report is based on.

Q. And that, as shown in the slide, would be 21.5 excess cancer cases in 100,000 people, correct?

A. That would be the statement used, but the calculation actually just relates to animals because there's no extrapolation factor to humans. The background actual risk of cancer is 1 in 2 or 1 in, say, 200 for liver.

But according to this very conservative and unprecise way of calculating this, those values are 21.5 out of 100,000 theoretical excess lifetime cancer risk from this linear back-extrapolation.

Q. Do you know how many patients were on valsartan in the United States during the time of the contamination?

A. I do not know the exact number,

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but I can appreciate it would be a high number as it was a very, very well prescribed drug, including some of my colleagues being on it, and my mom being on it.

So extrapolating from my personal knowledge, I would see a lot of people would have been on this drug, but I don't know those numbers.

MS. BOGDAN: If we could pull up the next slide, please, which is Calculation of Excess Risk for Less Than Lifetime Exposure.

(Interruption by the stenographer.)

(Whereupon, Deposition Exhibit Johnson-31, Demonstrative, Calculation of excess risk for less than lifetime exposure, NDMA average in API, was marked for identification.)

THE WITNESS: I have that.

BY MS. BOGDAN:

Q. Are you able to see it?

A. I'm able to see it.

Q. I'm sorry, did you say you're

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unable to see it or you can see it?

A. I can see it.

Q. Do you recognize this slide?

A. I recognize this slide, again, from the slide set from Roland Frotschl that he presented in a GUM meeting, a Germany mutagenicity meeting, that I have taken in order to explain or partially explain to the best of my ability this -- this approach of linear back-extrapolation carried out by the regulatory bodies, in this instance, EMA, in these issues. Yes, I do recognize it.

Q. Is this slide similar to the last slide but it explains how the FDA and EMA calculated the acceptable intake for NDEA and the last slide was for NDMA?

A. It does explain how the regulatory bodies, including FDA and EMA, calculated up to 26.5 in that third column for acceptable intake. And beyond that, I think there would be some differences between those bodies, but I can't state exactly what those would be.

Q. And the 26.5 acceptable intake

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limit, is that in nanograms?

A. 26.5 is in nanograms per day, as the acceptable intake calculated from the linear back-extrapolation using a 50-kilogram human, 26.5 nanograms per day.

Q. And the permissible daily exposure that you calculated in your 2021 publication was 2.2 micrograms or 2,200 nanograms, correct?

A. I can see from my publication in 2021 the PDE with these different assumptions, which is expanded upon in my report, which is a better appreciation of my actual risk assessment here than this publication, which is a more basic version.

But, yes, those numbers, 2.2 micrograms per person per day for NDEA, using the lower bound for the BMD and so on, with the same composite uncertainty factors at a human population at 50 kilograms, yes.

Q. And 2.2 micrograms is 2,200 nanograms?

A. Yes, it is. I'm happy to state that that is correct.

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Q. And that is compared to 26.5 nanograms that's the acceptable intake as calculated by the FDA, correct?

A. I -- can you reword that, please? I didn't fully understand the question.

Q. I'm just trying to have the comparison in the same units of measure.

So the FDA's acceptable intake limit is 26.5 nanograms, as shown on this slide, and the permissible daily exposure that you calculated is 2,200 nanograms, correct?

A. It's correct apart from I also expanded on the PDE as shown in my report. But that's correct. 2.2 microgram person -- per day could be also in the units of 2,200 nanograms per day as you stated.

Q. And then going over to the last column, which is the theoretical excess lifetime cancer risk, and that was calculated for a patient taking a 320-milligram-per-day valsartan contaminated with 3.7 micrograms per tablet for four years, correct?

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A. According to this slide, that's correct. I'm unsure exactly how this calculation was carried out because at the top it says the API, and I didn't produce this slide and calculation myself, hence my inability to expand on that.

But that's the statement here that Roland put forward at that meeting, and I don't -- I used this slide, some of this extent for my presentations. So if taking 320 milligrams per day valsartan contaminated with 3.7 micrograms for four years, then his calculation were these metrics below.

Q. Which would be 8 excess cases of cancer per 100,000 people, correct?

A. According to his calculation, based on these figures of 3.7 micrograms of NDEA, the estimation in that large drug, the 320-milligram-per-day valsartan tablet for four years, using the linear back-extrapolation from the TD50 from the rat liver tumors, with the assumption of linearity, leads to those figures at the end of 8 in 100,000 or approximately 1 in 12,500,

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which when we consider the actual human level of cancer of, say, 1 in 2 or 1 in 200 for liver, becomes a different way to consider these metrics.

Q. But these metrics with regard -- as to how the FDA does their risk assessment is the FDA is concerned with trying to prevent excess cancer risk associated with exposure to NDEA in medication; isn't that correct?

A. This is the EMA version of the calculation, so those final columns may differ to the FDA calculation, and I'm -- I didn't know the extrapolation from the API in this instance, so I could not confirm whether that is correct or not.

MS. BOGDAN: If we could go to the next slide, please, which is PDEs Developed for NDMA and NDEA.

(Whereupon, Deposition Exhibit Johnson-32, Demonstrative, PDEs Developed for NDMA and NDEA, was marked for identification.)

THE STENOGRAPHER: Exhibit 32.

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BY MS. BOGDAN:

Q. Do you recognize this slide?

A. Still loading. It is on my screen.

Yes, I recognize this slide.

Q. And does this slide set forth the permissible daily exposure limits that you calculated, as reflected in your 2021 publication?

A. This slide represents PDE metrics from the lower bound of the BM -- of the BMD10 using these adjustment factors as stated with the same calculation as in the publication, but the unexpanded version of this that we will see in my report.

Yes, this corresponds to that publication. That is correct.

Q. And you have in the charts the mutagenic PDE expressed in micrograms, correct?

A. The mutagenic PDE is expressed in micrograms per day.

Q. Okay. And so if that was converted, for example, the NDMA mutagenic

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PDE of 0.6 micrograms per day -- if that was converted to nanograms, would that be 600 nanograms?

A. That would be a correct exchange of unit --

Q. And that --

A. -- by day. Per day.

Q. Per day.

And then similarly, underneath that, the carcinogenic PDE of 6.2 nanograms a day -- or micrograms a day, if that was converted to nanograms, that would be 6,200 nanograms a day, correct?

A. So that would be a correct exchange of units as we've just done previously with the same number in one of the last questions.

Q. And then those could be compared in the same units of measure to the AI established by the FDA of 96 nanograms per day, correct?

A. They could be compared in either unit.

Q. So if we were going to convert

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the AI TD50 for NDMA to micrograms, that would be 0.096 micrograms, correct?
A. Correct, per day. It needs to be per day.
Q. Yes, per day. All right.
And then similarly, over for NDEA, the mutagenic PDE would be converted to 46 nanograms per day? That would be how to convert that unit from micrograms to nanograms?
A. A conversion of a thousandfold would be how you convert from microgram per day to nanogram per day, correct?
Q. And the carcinogenic PDE for NDEA would be 2,200 nanograms, correct?
A. It would be 2,200 nanograms per day. Again, we need to add in per day.
Q. Well, these are all per-day figures on this PowerPoint slide, correct?
A. The adjustment factor is not in that unit, but the PDEs are in microgram per day, and the AIs are currently in nanogram per day.
Q. Now, the mutagenic PDEs that

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appear on this slide, those are values that you calculated in your 2021 publication, correct?
A. Those were calculated from the best dataset that we could find for in vivo gene mutation, which was not to the level of the OECD guidance and not robust enough to carry out a risk assessment on.
But for the ability of this publication, we calculated this as a proof of concept to state that you could calculate the PDEs in this way, and this is what they look like.
And the lower bound of that, with the assumption of quite major adjustment factors totaling to 5,000 for those, that the lower bound of the BMDL would be 0.6 microgram per day for NDEA -- NDMA. NDMA.
Q. So that would represent, in your estimation based upon your calculations, the level of NDMA per day that would result in mutations, correct?
A. I would not make robust

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conclusions from this dataset. Again, common name popping up, Gollapudi, et al, 1998, their group carried out the most extensive NDMA dose response to date. It was the best regarding close to being OECD compliant, but not OECD compliant.
So the conclusions around the mutagenic PDE are not robust enough for risk assessment decisions to be made on.
Q. But they were robust enough for you to report them in your research article that you published in May of 2021, correct?
A. They were correct with the caveats put forward in the publication, just with the statements around having issues in the dataset as well.
So correct, suitable for publication. I -- but not suitable for risk assessment at the current time.
Q. And the PDEs for mutation as put forth in your published article are exposures per day that would result in mutation caused by either NDMA or NDEA at those levels, correct?

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A. The units used in these publications is milligrams per kilogram per day for NDMA. And again, that's -- the study design was not robust enough for us to make solid conclusions about that for risk assessment purposes.
But using these data, we could get to 0.6 micrograms per day for NDMA or 0.046 micrograms per day for NDEA.
Is that -- did I -- apologies if you need to restate the question.
Q. What does the mutagenic PED calculation represent?
A. The mutagenic PDE calculation represents an extrapolation from the BMD lower confidence interval calculated from in vivo genetic mutation data and extrapolated from animals to humans -- that's the first adjustment factor of 5 within the adjustment factors -- to account for variation in the population around DNA repair, assuming that someone who doesn't have any DNA repair capacity -- that's the second one.

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And then I think severity of effect and exposure duration would be the next 10 and the next 10. And then whether we defined the final value of the point of departure would be the final value.

So the assumption is -- you've made all those assumptions and you're extrapolating the mutation, BMD, to estimate a potential human DNA, potential one. Again, this would not be precise enough from this particular dataset. And those are the sorts of assumptions.

So this was a proof of concept, and that's what these values represent.

MS. BOGDAN: If we could please pull up Exhibit 28 again.

A. I have Exhibit 28 in front of me.

BY MS. BOGDAN:

Q. Okay. And this, again, is the February 14th, 2019 publication by the EMA. If we could please go to page 24.

A. I'm on page 24. My page 24 starts with Table 10.

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Q. Perfect.

I'd like to direct your attention to Table 10.

A. I'm directed.

Q. Okay. And the EMA is doing a comparison here of the TD50 and their use of the benchmark dose approach to calculate theoretical excess lifetime cancer risks.

Do you see that?

A. I do see that, using the linear back-extrapolation from the TD50 and the benchmark dose lower confidence interval to calculate theoretical risk. I do see that.

Q. And so the first row for the TD50 rat liver tumors, do you see that?

A. I do see that.

Q. They are doing the calculation and coming up with the acceptable intake limit, which is the intake limit that is permissible of 96 nanograms.

Do you see that?

A. I do see that.

Q. Okay. And then the EMA is using the benchmark dose approach in the row

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under that for the lower range, and coming up with an acceptable intake limit of 9 -- 145 nanograms per day.

Do you see that?

A. I do see that from the linear back-extrapolation of the BMDL10 rat liver tumors, if you draw a straight line back from them, an estimated 50-kilogram human, then that calculation leads to the 145 nanogram per day presented there as the acceptable intake. Yes, correct.

Q. And then the EMA does the benchmark dose approach for the upper range in the next row, and derives an acceptable daily intake limit of 215 nanograms.

Do you see that?

A. I do see that, but it was incorrect. It's the BMD lower confidence interval. That's the BL -- it's BMDL, not BMD upper.

Q. Oh. I see.

A. Okay.

Q. So in that last row, they're doing another benchmark dose lower confidence

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interval calculation and coming up with an acceptable intake of 215 nanograms per day, correct?

A. Yes, their use of the BMDL10 in this instance, where they drew a straight line back from that BMDL10 and assumed a population of 50 kilograms of humans, they got the acceptable intake of 215 nanograms per day. I see that, yes.

Q. So in this table, the first value, 96 nanograms, is using the linear extrapolation approach from the TD50, correct?

A. Correct, yes. Using the linear back-extrapolation from the TD50 to get 96 -- (audio malfunction) --

(Clarification requested by the stenographer.)

A. I will restart from the -- yeah.

So I see the 96 nanograms per day that I was directed to see. I see that value and that it was calculated using the TD50 from rat liver tumors with the

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assumption of a 50-kilogram human to get the acceptable intake of 96 nanograms per day. I do see that.
BY MS. BOGDAN:
Q. Okay. So in this chart, the acceptable intakes that are being calculated by the EMA are 96 using the TD50, 145 nanograms using benchmark dose lower 10, and then 215 nanograms using the benchmark dose lower 10, correct, as shown on the chart?
A. As shown on the document, the 96 refers to the linear back-extrapolation from the TD50; the 145 refers to a linear back-extrapolation from the BMDL10, first example from the rat liver; and the final value of 215 represents the linear back-extrapolation from the BMDL10 rat livers to calculate and present these acceptable intakes for the estimated population of a 50-kilogram human, correct.
Q. And your calculation for the permissible daily exposure is 6,200 nanograms, correct?

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MS. LOCKARD: Objection, form, vague.
A. The lower bound of the PDE, as you've stated as being 6.2, and adjusted to nanograms or conversion of units, would be, as you stated, 6,200.
From the lower bound of the PDE from my publication, where we used the PDE which assumes a threshold mechanism of DNA repair, and then allows these adjustment factors to calculate human risk instead of drawing a straight line from the BMDL10, leads to these values that you've suggested, and I'm explaining a bit of the difference and why they're different.
MS. BOGDAN: If we could please pull up the next exhibit, which is Snodin, Short Commentary on NDMA Contamination of Valsartan Products.
(Whereupon, Deposition Exhibit Johnson-33, Short commentary on NDMA (N-nitrosodimethylamine) contamination of valsartan products, by Snodin et al, was marked for identification.)

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THE STENOGRAPHER: Exhibit 33.
BY MS. BOGDAN:
Q. Please let me know when the exhibit is available for you to view.
A. Which exhibit? I can see 32.
Q. Can you see the short commentary on NDMA?
A. 33? Is that Exhibit 33? Yes, Short Commentary on NDMA, yes.
Q. And you're familiar with this article, correct?
A. I am familiar with this article, correct.
Q. And in this article, they do a risk assessment for NDMA, correct?
MS. LOCKARD: Objection, form, misstates the record.
BY MS. BOGDAN:
Q. Well, let's please go to page 327.
A. I'm on page 327.
Q. Do you see the section entitled Risk Assessment for NDMA?
A. I see the section Risk

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Assessment for NDMA.
Q. And does Snodin in this article do a risk assessment for NDMA?
A. I do not know.
Q. Okay. Directing your attention to the section that's highlighted there about two-thirds of the way down, there's a sentence that begins "Since exposure via pharmaceuticals."
Do you see that?
A. I -- can you redirect it to me? Sorry, I'm getting tired. Can I see it again, please?
Q. Okay. Sure. I think it's highlighted, actually, on the Zoom, if that helps you find it.
A. Okay.
Q. It's right --
A. Since exposure -- I've seen it: Since exposure via pharmaceuticals is unlikely.
Q. Okay. So it reads: Since exposure via pharmaceuticals is likely to last more than a few years, the ICH M7

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less-than-lifetime approach can be applied to the most conservative value of.

Are you familiar with the less-than-lifetime approach?

A. I have some familiarity with the less-than-lifetime approach.

Q. And is that a way to do a risk assessment?

A. From my understanding of the less-than-lifetime approach, it's a way to do a risk assessment and adjust an acceptable intake to less than lifetime.

Q. Okay. And in this publication, that is what Snodin wrote about here in this sentence that begins "Since exposure via pharmaceuticals is unlikely to last more than a few years"?

A. According to my understanding of this document and reading this specific statement, that is what it shows, that this is an explanation of the less-than-lifetime approach here, yes.

Q. And then continuing on reading that sentence, please, can you tell me what

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values he arrived at in determining the daily exposure limit?

A. Reading it out would be the result is 0.64 micrograms per day if exposure is under 10 years, and 1.2 microgram per day if exposure is under 1 year. Assume -- and that's under the assumption of the assumptions below. And this is also assuming a linear back-extrapolation, again.

Q. So the daily exposure limits being calculated by Snodin would be 0.64 micrograms per day if exposure is less than 10 years and 1.28 micrograms per day if the exposure is less than 1 year, correct?

A. Yes, that is what's stated here due to a correction of the acceptable intake that was calculated using a linear back-extrapolation. When that's corrected here for less than lifetime, they state here those metrics which you've read out, and yes, that's what it states here.

Q. And those values are, again, different than the permissible daily exposure values calculated by you, correct?

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A. That is correct. As one would assume from extrapolating back, a straight line from the TD50 and ignoring the dose-response relationship, you would assume that that would lead to a different value than if you accepted a nonlinear dose response with a DNA repair mechanism and carried that dose-response modeling to actually define the point of departure and extrapolate from that.

And that would explain why you would see such a difference and the overconservative nature of a linear back-extrapolation approach compared to one based on nonlinearity.

So that's the explanation as well as a bit more information there.

Q. You stated the overconservative nature in your last response, correct?

A. I stated overconservative nature in my last response.

Q. When determining limits of exposure to a genotoxic mutagen, isn't it recommended to be conservative in order to

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minimize risk associated with exposure?

MS. LOCKARD: Objection, vague, speculation.

A. When assessing risk for an exposed population, it would be good to be conservative, and it would also be good to be precise. And I put forward a precise and conservative calculation in the PDE.

BY MS. BOGDAN:

Q. Can you point to a human study where the daily exposure limits that you have set forth have been administered to humans over an extended period of time and the results of that study have shown that those exposure limits are safe?

A. There would be multiple examples that I would not be associated with, with complete drugs on the market that that statement would agree to, and another example would be -- that I was associated with, would be when we showed exactly that, that an exposed population of 25,000 people to Viracept that had a low level of EMS in a certain batch of that Viracept, we showed

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that that population did not have increased risk of cancer.

We published on that. We put an impact story around that, submitted it to our research excellence framework. So that would be a good example to do it. So yes. There will be other examples, but that's a good one.

Q. But the EMS contamination was not NDMA, correct?

A. The EMS contamination was not NDMA, correct.

Q. And the EMS contamination was not NDEA, correct?

A. The EMS contamination was not NDEA, correct.

THE WITNESS: I'm going to need some food soon. I'm getting tired. Can we talk?

MS. LOCKARD: We're going to need to take a break, I think.

MS. BOGDAN: Okay. We can go off the record.

THE VIDEOGRAPHER: Going off

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the record. The time is 11:50 a.m.

(Recess taken, 11:50 a.m. to 12:13 p.m. BST)

THE VIDEOGRAPHER: We're back on the record. The time is 12:13 p.m.

BY MS. BOGDAN:

Q. Dr. Johnson, are you aware that there are dietary studies that showed a statistically significant increased risk of cancer with increased dietary exposure to NDMA?

A. I am aware of some food-based studies where that conclusion was made, but there was obviously a mixture within those foods of other carcinogens, but I'm aware of those studies, yes.

Q. Did you determine the total exposure for those people in the studies that had a statistically increased risk of cancer?

A. Can you repeat the question, please?

Q. Sure.

Did you calculate the total exposure to NDMA that the people in the

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studies who had a statistically increased risk of cancer?

MS. LOCKARD: Objection, form.

MS. BOGDAN: Let me ask it another way.

BY MS. BOGDAN:

Q. In the studies there were groups of people that had a statistically increased risk of cancer associated with certain levels of dietary exposure to NDMA.

Did you calculate what those levels or exposure were for those people that had a statistically increased risk of cancer?

MS. LOCKARD: Objection, vague. What studies are we talking about now?

MS. BOGDAN: The dietary studies.

MS. LOCKARD: Which dietary studies?

THE WITNESS: I would need to see those.

BY MS. BOGDAN:

Q. No, I'm asking if you, at any time, calculated the total amount of NDMA

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that people were exposed to in the dietary studies that resulted in a statistically significant increased risk of cancer? Did you do any such calculation?

MS. LOCKARD: Objection, form, vague.

A. I looked at the studies in which NDMA was referenced in some food studies, and that had no link to the calculations I performed, which are PDEs, as stated on page 60 of my report.

BY MS. BOGDAN:

Q. So for the work you did on this case, you did not rely on any of the information in the dietary studies; is that a fair statement?

A. I would state that I considered those studies and did not deem those human studies to be precise enough to be able to contribute to a human exposure limit calculation.

In this instance, you would use an animal-based study, which is what I've done, as presented in my report.

Q. So you chose to use an animal-based study for your calculations as opposed to the human dietary studies, correct?
A. I chose to do that in line with best practice and all the other regulations. All the acceptable intakes were in line with that as well, from the relevant animal studies and not from the human studies as well. So yes, that is correct.
Q. Do you agree that in the dietary studies they were seeing increased risks with NDMA levels at hundreds of nanograms per day?
MS. LOCKARD: Objection --
A. I would have to --
MS. LOCKARD: -- form, vague.
A. I would have to see the specific document to comment on specific numbers.
BY MS. BOGDAN:
Q. When you reviewed the dietary studies, did you make notes of the daily intakes of NDMA of the persons in the

studies?
A. When I saw the dietary studies, I think as referenced in one of the expert reports -- I cannot recollect which one -- that targeted me towards those data.
I looked at those data and saw that it was not a precise measure of just NDMA, and there would always be confounding factors within such a dietary study with over 99% of known carcinogens are in food, and none of that would be accounted for by just basing the decision on one of such substance.
So for that reason, it did not contribute to my report and did not -- will not change my opinion as stated in my report.
Q. So the dietary studies that you did review were not used to formulate your opinion in this case, correct?
A. The dietary studies were considered, as was a lot of information. They were rejected as useful sources of information for which to define and calculate a precise level of human risk that we could use as a permitted daily exposure or any

other risk assessment approach.
So regarding the calculations and opinions based on calculations, they formed no link to those calculations regarding metrics.
Q. So you did not use the dietary studies as the basis for your opinions in this case?
MS. LOCKARD: Objection, form, asked and answered.
A. My opinions are based, as we can see in my report, on dose-response analysis of the most suitable cancer bioassay data, the most suitable cancer data in any species, including humans, for which you can calculate human risk.
So for that reason I selected the most suitable data to calculate these human daily exposure limits, which did not include those -- those numbers from the food studies.
MS. BOGDAN: Can we please pull up the Fitzgerald study, Development of Tolerable Daily Intake?

(Whereupon, Deposition Exhibit Johnson-34, Development of a Tolerable Daily Intake for N-Nitrosodimethylamine Using a Modified Benchmark Dose Methodology, by Fitzgerald et al, was marked for identification.)
THE STENOGRAPHER: Exhibit 34.
MS. BOGDAN: Are you able to find it?
TRIAL TECHNICIAN: Yep, coming up now.
THE WITNESS: Yeah, I've got it. It is loaded on my screen.
D. James Fitzgerald and Neville Robinson. I can see it.
BY MS. BOGDAN:
Q. Are you familiar with this study?
A. I have seen this study.
Q. And just directing your attention to page 1 of the study.
A. I -- the pagination in the textbook, does that start -- is it 1670?

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Q. 70, correct.
A. Excellent. I see that.
Q. And do you see in the abstract that these authors developed a tolerable daily intake using the modified benchmark dose methodology, and they report a TDI range -- and this is at the bottom of the abstract -- of 4.0 to 9.3 nanograms per kilograms per day.
Do you see that?
A. I can see this approach of the benchmark dose followed by arithmetic and exponential weight averaging which, to my understanding, is not in line with the standardized way of carrying out benchmark dose calculations in line with those from the RIVM in a statistical program called PROAST, which has been harmonized with the BMDS software available from EPA as the go-to and recommended way of carrying out BMD analysis.
I do not identify this as being in line with that way of calculating the BMD, and I see they used a 5% extra risk dose where the recommendation within expert

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regulatory bodies would be a 10% extra risk dose instead.
I see that using their approach, they came up with those figures of the BMD. And then I haven't looked -- I can look at the adjustment factors that they would have used to correct it to calculate to the TDI.
So I see it and I've identified some issues immediately. But I see it, yes.
Q. And those TDI ranges reported in the study of 4.0 to 9.3 nanograms per kilograms per day are different values than what you calculated using your benchmark dose approach, correct?
A. I can see that the TDI range of 4.93 [sic] nanograms per kilograms per day as calculated from this problematic use of benchmark dose modeling on these data resulted in these metrics presented within this abstract, yes.
MS. BOGDAN: Could I have a time check, please?
THE STENOGRAPHER: 2:40.

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MS. BOGDAN: I'll pass the witness at this point.
MS. LOCKARD: Okay. We'll take a short break. I'm going to need about -- I've got exhibits downstairs I need to get pulled together, so I would say probably about 15 minutes, so...
THE VIDEOGRAPHER: Going off the record. The time is 12:25 p.m.
(Recess taken, 12:25 p.m. to 1:02 p.m. BST)
THE VIDEOGRAPHER: We're back on the record. The time is 1:02 p.m.

EXAMINATION

BY MS. LOCKARD:
Q. Dr. Johnson, how are you doing?
A. I'm doing great. Thank you.
Q. Okay. Can you spare a little more time, a few more questions on the record for you, and then we'll be done.
A. I definitely can.

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Q. And for the record, I'm Victoria Lockard. I represent Teva. And I am going to be asking the questions on behalf of the defense.
A. Understood.
Q. So, Dr. Johnson, yesterday you were asked if drug companies stood to benefit from your PDE because it would allow them to sell more drugs with higher levels of nitrosamines.
Do you recall that?
A. I do recall that, yes.
Q. Was that your intent in pursuing this area of interest?
A. It was not my intent when pursuing this area of interest. My friend and colleague came to me. He had actually taken the drug, and it had been recalled. I talked to my mom, and she had also taken the drug and it had been recalled.
And I realized that in addition to it relating to our current situation, it would also produce peace of mind to my friends and family that are on it, as well as

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to the exposed population and other patients.
So there's quite a high level of peace of mind from knowing that you're not at increased risk of cancer from taking something. So I pursued it for that reason.
Q. Okay. You mentioned that your mom was on valsartan. Did I hear you correctly?
A. Yes, yes, she was on valsartan.
Q. Does your PDE opinion provide peace of mind to you that your mom was not exposed to an increased risk of cancer from her medication?
A. It absolutely provides that, and I have said as such to my mom.
Q. Let's talk a little bit about your background and qualifications. I have put a CV in front of you. I know we have one that's attached to your report, but let's make this a standalone exhibit.
What number are we on?
THE STENOGRAPHER: The next one in line will be 35.
MS. LOCKARD: Okay. So we'll

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make this Exhibit 35, just for your reference, Dr. Johnson.
(Whereupon, Deposition Exhibit Johnson-35, Johnson Exhibit A, Curriculum Vitae, was marked for identification.)
BY MS. LOCKARD:
Q. Where is Swansea University?
A. Swansea University is in Wales. It's in a city called Swansea. It's on the beach. That's where it is. It's in Wales in the U.K. in a city called Swansea.
Q. Did you grow up there?
A. I grew up in another seaside town called Brighton, and then I moved to Swansea.
Q. Have you spent any time in the United States?
A. I have spent some time in the United States.
Q. Okay. Have you traveled for business around the U.S.?
A. I have traveled quite extensively for business in the United

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States, and also for pleasure in the United States on numerous occasions as well.
Q. You were explaining a little bit about the professorship levels earlier. Are the professorship levels different in the U.K. than they are in the U.S.?
A. In certain universities they are. They go from -- they go from tutor, which is not on the career grade, which you would call tenure; to lecturer, which is a career grade tenure; to senior lecturer; to reader; to professor. Our university a few years ago changed from that system to harmonize better with the U.S. system.
We still have the tutor, which is not tenure. We have lecturer, which is tenure. And associate professor -- senior lecturer -- sorry. I haven't done it for a while. Tutor, not tenure; lecturer, tenure; senior lecturer, tenure; associate professor, tenure with me. And the final goal is professor, full professor.
Q. And are you tenured?
A. Yes, I'm on the -- I'm tenured,

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which my interpretation is I'm in the business plan, yes.
Q. And are you on track to becoming a full professor?
A. I'm on track to become a full professor, and one of the last pieces of the puzzle is to either demonstrate a series of publications in high-impact journals and/or to produce a high-impact story which is assessed by our research excellence framework, which is carried out every seven years. And if that is judged by them to be four star, which is of global impact, then I will use that to apply for professorship.
Q. So although you had testified at one point that you didn't get any extra pay for doing your research on the PDE that resulted in your 2021 paper, is the research that you did in connection with your PDE work -- is it part of your research obligation as a -- as a professor at the university?
A. It's entirely part of my obligation as a researcher, as a professor,

associate professor, in my university. I publish papers. They get judged again on this scale of 1, 2, 3, 4 star. If I have 3-star or 4-star publications, they get submitted to Research Excellence Framework, they contribute to my PDR, my professional development review, and I'm judged I'm succeeding as a researcher by publishing numerous papers.

So this -- these publications that we're commenting on today have all contributed to my career progression. I'll continue to research on this topic and publish papers all my time at Swansea University because it's part of my job.

Q. What qualifies as high impact?

A. High impact for a publication has a few criteria. The easiest criteria is impact factor, such as nature or science, something like that. In toxicology -- and this is all based on number of citations. In toxicology, the impact factor is lower, say, three or four. I think some of them are about six. So these would be judged as

medium impact.

But then regarding the impact story, it's has your work made an impact, made a change, supported something such as this, such as many individuals know that they're not at increased risk of cancer, that's a numerical scale. So that's an impact. Everything is impact.

So my work is very impactful in straight publication ways and in the application of this work in many different scenarios.

Q. Have you ever gotten any 4-star impact recognition for any of your papers?

A. I think our 2007 Doak paper was. Potentially another publication was. More relevant to today would be we had -- I think it was 2014, the last Research Excellence Framework, we submitted an impact story based on our contribution to the EMS Viracept case. We submitted that to the Research Excellence Framework, which judges research excellence in a seven-year period for all universities in the U.K. And they

deemed that as the highest level of impact, so we had 4-star impact in that scenario.

MS. LOCKARD: Okay. Steve, can we pull up the Swansea University Genetic Toxicology page.

MR. HARKINS: This is going to be doc number 208 on our internal tracking, marked as Exhibit 36.

TRIAL TECHNICIAN: Thank you.

(Whereupon, Deposition Exhibit Johnson-36, Swansea University Genetic Toxicology Webpage, was marked for identification.)

BY MS. LOCKARD:

Q. So I'll hand to you a document that's been marked as Exhibit 36. Do you recognize this document?

A. I recognize this.

Q. What is this?

A. This is our impact story.

Q. Does this relate to the Viracept publication that you were referencing?

A. It entirely relates to that.

And Swansea, including myself's, contribution to that impact story and the evidence of the impact and our link to this -- this major incidence, and we detailed the impact throughout in lines with what I was talking about.

MS. BOGDAN: Could we please -- excuse me -- pull up the exhibits on the screen, because I can't see what the witness is looking at.

TRIAL TECHNICIAN: Steve, should I pull that up?

MS. LOCKARD: Do you have access for the box?

THE WITNESS: Could we put it maybe in the link?

TRIAL TECHNICIAN: It's in the link. Would you like me to put it on screen as well, Steven?

MR. HARKINS: Yes, if you could put that on screen, that would be good. Thank you.

TRIAL TECHNICIAN: No problem.

BY MS. LOCKARD:

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Q. So why was this deemed to be a high-impact piece of work, to your understanding?
A. To my understanding, because we were able to support and show that low levels of this genotoxicant, this genotoxin, ethyl methanesulfonate, did not increase the risk to this population of 25,000 patients. That was deemed of major global impact.
Q. And was this paper and your conclusions -- were these considered by certain regulatory authorities in considering whether to change their regulations or their guidelines?
A. This was submitted actually in line with the guidelines at the current time as presented in ICH, where they highlight that if you can prove genotoxic threshold mechanism with DNA repair in line with how we're doing it today, if you can prove that, then you can use the PDE within the ICH M7 guidance.
That whole piece, that whole concept, all that data was put forward to the

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European Medicines Agency and accepted.
Q. And the EMA accepted that work, which was also based on the PDE; is that right?
A. That is correct.
Q. So this says on paragraph 2: Previously, before 2008, genotoxicity was assumed to be linear with respect to drug dose and genotoxic drugs were discarded. This was based on the precautionary principle as no one really understood low-dose effects.
And do you agree with those statements?
A. We had to broaden those statements to allow a wider readership to understand it, but another concept within this is there was already a subgroup of genotoxicants for which they were already accepted to have a threshold, and those would be antigens. So those were already accepted.
And this is really talking to whether the mutagenic -- the substances that interact with the DNA and cause mutations, whether those same principles could be

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applied. And we provided our information based on DNA repair and dose-response analysis.
Q. Have you received any other awards with respect to your work as a genetic toxicologist?
A. I have, yes. So for my undergraduate project, when I stated previously I won the Roger Gilbert Award for quantitative excellence in genetics, and later on I won an award from the United Kingdom Environmental Mutagen Society, UKEMS.
I later won an award from -- and these are young scientist awards -- from UKEMS, and then I later won the European version of that, so European Environmental Mutagenesis and Genomics Society, EEMGS. I won their young scientist award; later became president of that, the youngest-ever president for that society. I'm currently vice president for that society. And I may have won other awards, but those are the ones I recollect.
Q. Do you serve on any editorial

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panels?
A. I serve on EMM, the one we've discussed, to some extents, Environmental and Molecular Mutagenesis. I sit on their panel of editors. And that's linked to the American version of the EEMGS and UKEMS, which I've just stated. So I sit on that.
And also I sit on the Japanese version of that called JEMS, Japanese Environmental -- Environmental Mutagen Society; their journal as well, called Genes and Environment. And I don't think I sit on any other ones, but I have a heavy workload. I may not recollect.
(Interruption by the stenographer.)
BY MS. LOCKARD:
Q. What do you hold degrees in, Dr. Johnson?
A. I have an undergraduate degree in genetics. I have a Ph.D. with a title explained in my CV in genetic toxicology and quantitative analysis of data and aspects of hazard and risk assessment with a Ph.D.

level.
I have a teaching qualification as well, a postgraduate teaching certificate. That's a qualification. I am a registered toxicologist with BTS, British Toxicological Society, and the European version of that; and I think that's called BRT and ERT. And I think that's the extent of my qualifications, but I may have missed one.
Q. And as part of your -- you're currently teaching; is that correct?
A. I teach all year round, correct.
Q. As part of your teaching, do you teach genetic toxicology?
A. I teach genetic toxicology at undergraduate level, at master's level, at Ph.D. level, also at conferences, also with regulatory bodies, also for societies globally.
Q. And do you provide presentations on risk assessments?
A. Yes. Many of those presentations include risk assessment

teachings, yes.
Q. Have you -- and have you -- to your students, have you included -- well, strike that.
Do part of your teachings that are associated with your academic appointment at the university include teaching foundation for performing risk assessments?
A. We discussed that in our genetic toxicology module in undergraduate teaching. And at Ph.D. level, I have taught numerous students of mine risk assessment, and they've applied that. Many of them have got quite good jobs now in industry where they're able to apply this understanding as well. So yeah, I teach -- I teach this at many different levels.
Q. So this was not the first risk assessment you had done; is that fair?
A. Certainly not.
Q. You were shown yesterday a document which I believe was Exhibit 3, so if we could pull that up again. And it was the 2021 [sic] HESI Annual Report.

TRIAL TECHNICIAN: I'm sorry, which doc number is that?
MS. LOCKARD: I believe it was 3.
THE WITNESS: Looks correct.
MS. LOCKARD: Now I'm having a problem with exhibits.
THE WITNESS: They've got it up in Zoom.
MS. LOCKARD: Let's see. Okay. Yep.
BY MS. LOCKARD:
Q. Do you remember being asked about this report and all of the pharmaceutical industry individuals who were a member or HESI yesterday?
A. I do remember that with focus on the pharmaceutical individuals in this document, yes, I do.
Q. What does HESI stand for?
A. Health and Environmental Science Institute is what I think it stands for --
Q. And --

A. -- yes.
Q. -- if you turn to page 2 with me of this document, can you tell us what your understanding of HESI's mission is?
A. Sorry, I was on the wrong page. The vision or the mission?
Q. The mission.
A. The mission. HESI's mission as stated here: HESI's mission is to engage scientists from academia, government, industry, nongovernment organizations and other strategic partners to collaboratively identify and help to resolve global health and environmental changes [sic].
Q. When was HESI founded?
A. It was founded in 1989 as a nonprofit charitable organization.
Q. You discussed yesterday this -- I think you called it a tripartite approach at HESI. What did you mean by that?
A. Tripartite is an essential formation of such a committee. Tripartite in this instance refers to the academic part, so it means three, tripartite. One part is

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academic, one part is industry, one part is regulatory/government organizations.
Q. Does HESI hold itself out to be independent?
A. As far as I'm aware, they do hold themselves out to be independent.
Q. And on page 2, do you see the language that says -- that says as such?
A. Oh. Yes. So they -- there's a statement there: We are an independent organization that advocates the use of science in making decisions that affect human and environmental health.
There's a strict neutrality around policy issues, and our governance structure requires that more public sector members sit on our board of trustees than private sector members. And that's a very important aspect for us to consider.
Q. And so in your experience and understanding, is HESI a pro-industry organization?
A. No, it's a pro-science organization.

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Q. Is it a pro-pharma organization?
A. It is not a pro-pharma organization.
Q. Does HESI lobby or promote legislative policy on behalf of the pharma industry or chemical companies?
A. It definitely does not do that.
Q. Does HESI advocate for its members, the companies or the products?
A. It does not. There's strict rules around that.
Q. Does HESI pay its members or scientists?
A. It does not.
Q. How is HESI funded? Is it funded with grants from government agencies?
A. That's one aspect of its funding, to include government agencies that provide grants to HESI, yes.
Q. Are you aware that -- or do you know if HESI has ever been awarded grants by the U.S. Food and Drug Administration?
A. I am aware that they have been awarded grants from FDA and a very relevant one for today is FDA CDER, C-D-E-R.

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Q. On page 3 of this document, if you'll continue with me. So this appears to go through the timeline of HESI starting with its founding in 1989, which you already testified about.
If you follow along with me, in 2014, what happened? The second 2014.
A. In 2014, HESI signs -- my understanding of this word, MOU, I know what it means, but exact phrase, I think it's memorandum of understanding.
So HESI signs the MOU with FDA CDER starting a shared commitment to improving human health via enhanced regulatory science partnerships.
MS. LOCKARD: Okay. So let's have marked as Exhibit 36 --
THE STENOGRAPHER: 37.
MS. LOCKARD: Okay. 37. What was 36?
THE STENOGRAPHER: The last exhibit.

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MS. LOCKARD: Thanks. Thanks, Mike.
TRIAL TECHNICIAN: Exhibit 35 was your internal 211, and then didn't we go to this document, which had already been marked?
MR. HARKINS: Sorry. 35 was Dr. Johnson's CV. 36 was the Swansea paper. This is our internal number 205, which will be Exhibit 37.
(Whereupon, Deposition Exhibit Johnson-37, Memorandum of Understanding Between USFDA and HESI, was marked for identification.)
MS. LOCKARD: Okay. So if we can pull that up.
BY MS. LOCKARD:
Q. Have you seen this document before?
A. I've seen it, but I haven't read it in huge detail. I've seen it.
Q. Okay. Can you just read up at the top the title of the document for us?
A. The title of the document is

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Memorandum of Understanding Between the U.S. Department of Health and Human Services, the Food and Drug Administration, and ILSI, HESI, ILSI Health and Environmental Science Institute, so yeah.

Q. So under the Purpose section of this document, it says: The United States Food and Drug Administration, FDA, and ILSI Health and Environmental Sciences Institute, parentheses, HESI, share interests in promoting scientific progress through the exchange of scientific capital to address and reach consensus on scientific questions impacting the development of FDA-regulated products and the evaluation of human safety.

Has that been your experience at HESI?

A. That has definitely been my experience at HESI. Hence, some of my publications you'll see coauthorship with -- within this group with experts from FDA on that that are members directly of our subgroup at GTTC. So I definitely recognize and acknowledge this.

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Q. If you look about halfway down the paragraph on Purpose, the sentence that starts "The FDA"?

A. "The FDA and HESI," that one?

Q. Yes.

A. I see that.

Q. The FDA and HESI, partners, desire to collaborate on multiple activities, including: developing new methods to evaluate the toxicity of substances regulated by the FDA.

Do you see that?

A. I do see that.

Q. And is that the same purpose that you were trying to achieve in developing your PDE calculation and submitting that for publication?

MS. BOGDAN: Objection to the form.

A. That's entirely related to that publication and the publications leading up to that where we outlined the topic in extensive detail about how this approach can be carried out.

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BY MS. LOCKARD:

Q. So does FDA rely on and expect, to your knowledge of the agreement, the memorandum of understanding, expect that HESI will follow and develop the science with respect to, you know, new issues of concern, new evaluations of toxicity, and the kinds of things that we've been talking about today?

Do they expect HESI will be on the forefront of those items?

A. They expect --

MS. BOGDAN: Objection to the form, compound, speculative.

A. From my assumption, from my experience with FDA, experts within the HESI group, I do see that they acknowledge that the HESI group is at the forefront of exactly this, in developing new methods to evaluate the toxicity of substances regulated by the FDA. Definitely at the forefront of this.

BY MS. LOCKARD:

Q. Do you feel that that is something that has been encouraged by the collaboration between FDA and HESI?

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A. I think I am confident in saying I do think I support that statement, yes.

Q. Turning back to the last exhibit we were on, which was the HESI Annual Report.

A. Yeah, I have it.

Q. Okay.

A. So back to the HESI report?

Q. Yes.

Have you ever seen HESI and FDA host --cohost workshops?

A. I have seen workshops where HESI and FDA are participants.

Q. You were asked questions about the membership of HESI. If you can turn with me to page 4 of this document, and do you see a graphic there?

A. Yeah, I do see a graphic there.

Q. And there's a green graphic near the -- I guess tell me what does this green graphic mean there in terms of the makeup of HESI?

A. From my understanding of this

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green aspect of this little chart, is it shows that we have 291 partners at this time of publication. A large proportion of that, 124, from academia, which are universities; 61 from government/regulatory agencies -- and to my understanding, that's probably nearly all of them. That's a lot of government/regulatory agencies -- 80 from industry; 26 from NGOs, which I think is nongovernment organizations. There's also research institutes and others.

So that's my understanding of the breakdown of these partners.

Q. So if I understand your testimony about this document, there are far more academic partners than there are industry partners according to this graphic in the annual report, correct?

A. Definitely correct, according to these numbers in this annual report.

Q. Do you know whether out of the government/regulatory agencies, is EMA one of the agencies that is a government partner with HESI?

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A. I am not a hundred percent sure, but I know that EMA experts being within our committee for numerous years within the GTTC, but I'm unsure if they have it under their EMA titles and/or their local regulatory titles. Apologies for the unsurety -- uncertainty.

MS. LOCKARD: Okay. Let's pull up the next exhibit, which will be 38.

MR. HARKINS: Chris, this will be 207 from our internal tracking, introduced as Exhibit 38, and if you could please screen-share. Thank you.

(Whereupon, Deposition Exhibit Johnson-38, HESI Government Agencies Webpage, was marked for identification.)

MS. LOCKARD: That's fairly small. We might be able to pull it up on the document link.

THE WITNESS: Number 37, is that correct?

THE STENOGRAPHER: 38 is the new one.

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MS. LOCKARD: 38.

THE WITNESS: Is it up there yet? Excellent, I can see it. It is on my screen, and I need to enlarge it.

I can now see it.

BY MS. LOCKARD:

Q. So this is a -- you can see from the top, the website for hesiglobal.org/partner, and a listing of our partners.

Are you familiar with the HESI website?

A. I'm very familiar with the HESI website.

Q. And so does this appear to be a listing of the HESI government agency partners?

A. This appears to be a list. I'm unsure if it's the full list, but I identify this as a list of government agencies within the HESI group.

Q. Okay. And if you look on the first column, four down, the European

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Medicines Agency is listed.

Do you see that?

A. I see that. I see that and I can now confirm from seeing this the European Medicines Agency is a partner of HESI.

Q. Let's look down at the bottom of the first page, right column, bottom row, the NIH, National Cancer Institute, are you familiar with that organization?

A. To an extent. I realize they're a very well-regarded institute. I do -- I am aware of them.

Q. Okay. And does this indicate they are a member, a governmental member of HESI?

A. This does indicate that, and I -- yes, it does.

Q. Do you see Health Canada on the list?

A. I do see Health Canada on the list, and there's many participants in our GTTC from Health Canada.

Q. Do you see -- on the second page, do you see where the USFDA is listed as

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being a member of HESI?
A. Yes, I do see that, and also different subsets of FDA as well.
Q. And at the top of page 2, do you see where the National Institutes of Health is listed as being a member of HESI?
A. I -- I do, and I think we have some NIH experts within our own committee as well, GTTC.
MS. LOCKARD: Next, Exhibit 39.
MR. HARKINS: This will not be a separate exhibit. It's a continuation of the same, if you continue to scroll down.
MS. LOCKARD: Oh, okay. I see. So if you can pull up 38 again and scroll down.
THE WITNESS: I've done that. I'm on page 3 of that.
BY MS. LOCKARD:
Q. Okay. Up at the top of this, similarly, it's a page from HESI's website. Do you recognize it as such?
A. I do recognize it as such.

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Q. And at the top of the listings, do you see where it says Academic Institutions?
A. I do see where it says Academic Institutions.
Q. So in terms of the tripartite organization, you talked about some industry, pharma members yesterday, and we've now covered governmental members, and so this would be the third leg or so of that tripartite, the academic institutions?
A. I fully agree with that, and yes, this is the list of the academic institutions.
Q. Is Swansea on this list?
A. Yes, it is.
Q. And do you see a number of well-recognized U.S. academic institutions on this list?
MS. BOGDAN: Objection to the form.
A. I do see a list of high-end, very excellent universities from America on this list.

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BY MS. LOCKARD:
Q. Do you see Columbia on this list?
A. Columbia? I see Columbia University on this list.
Q. Do you see Cornell on this list?
A. I see Cornell University on this list.
Q. Do you see Harvard on this list?
A. I see Harvard University on this list.
Q. Do you see Johns Hopkins on this list?
A. I see Johns Hopkins University on this list.
Q. Do you see MIT on this list?
A. I see MIT on this list.
Q. Do you see Stanford University on this list?
A. I do see Stanford University on this list.
Q. Okay. If we can go back, once

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again, to Exhibit 13, which is the Annual Report.
THE STENOGRAPHER: 3.
MS. LOCKARD: Excuse me, 3, Exhibit 3.
BY MS. LOCKARD:
Q. And again, yesterday, in the questioning by plaintiffs' counsel, you were asked questions about all of the industry members who serve on the toxicology committee.
A. Yes, that's true.
Q. Do you recall that?
A. Yeah.
Q. And that's the committee that you're most involved in; is that correct?
A. That is correct. That is my committee I am very involved in.
Q. Okay. So turning to page 35, if we can pull that up on the screen.
So in addition to all the industry corporations that were named yesterday, are there also a number of government/regulatory agencies and academic

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research institutes listed as participants in the toxicological division of HESI?
A. Yes, there is a list here of the government/regulatory agencies linked to HESI, enrolled and participate in the HESI Genetic Toxicology Technical Committee.
Q. Including those participating on the genetic toxicology committee, did that -- does that include the USFDA as well, according to this annual report?
A. Yes, it does include the USFDA in this report.
Q. And is your university, Swansea, listed on here along with a number of other academic research institutes?
A. Yes, Swansea University is listed here along with other academic and research institutes.
Q. And if you look down at the industry list that you went over the other day or yesterday -- I'll give you a second to glance at that -- do you see anywhere on this industry list the name Teva Pharmaceuticals?
A. I'm looking at the bottom, and

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the only ones in T are -- there's two beginning with T, and neither of those are Teva. So, no, I do not see Teva Pharmaceuticals there.
Q. Do you see Torrent on this list?
A. I do not see Torrent on this list.
Q. Do you see ZHP or Prinston on this list?
A. I do not see ZHP on this list.
Q. Do you see Aurobindo on this list?
A. I do not see Prinston on this list.
I do not see Aurobindo on this list.
Q. Do you see Mylan on this list?
A. I do not see Mylan on this list.
Q. To your knowledge, are any of the defendant manufacturers involved in this case partners at HESI?
A. To my understanding, I do not

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think that they are partners of HESI.
Q. Let me ask you if you have an understanding why -- why would -- I guess were you surprised by that, that the manufacturers are not involved in HESI?
MS. BOGDAN: Objection to the form.
A. I am not surprised by that. The defendant companies, from my understanding, are focused on generic pharmaceuticals. And when we carry out genetic toxicology, that's through -- only through the whole drug development and production pipeline to which we apply genetic toxicology and cancer risk assessment applications.
Any issues within that, we -- we research to a great extent. So if you're involved in the drug discovery and development pipeline, you would have a great interest in the new and best approaches in genetic toxicology.
My understanding is with generic pharmaceutical companies, it's a

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different process and it's more production of patent -- or out-of-patent, already accepted pharmaceuticals to which these concepts apply to a much -- much lesser extent.
So I would not predict their level of interest in these advanced applications would lead them to want to be a part of it. So it's not surprising to me at all.
BY MS. LOCKARD:
Q. Have you ever worked at Exponent?
A. I have not worked at Exponent.
Q. Do you recall being shown a document yesterday that essentially criticized Exponent and it was published by an entity listed as FairWarning?
A. I do remember that.
Q. Have you ever heard of FairWarning?
A. I have never heard of FairWarning.
Q. Not even the 1991 Van Halen album?

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Have you ever heard criticisms like that about Exponent before?
A. I have not heard criticisms about Exponent along those lines.
Q. And the things that were described in that article, what was the time period of that? Do you recall?
A. I recall the major criticism seeming to be in the 1990s if that's correct.
Q. Was that before you had written papers with any Exponent member?
A. That is definitely before I had written papers with Exponent and before I had qualified in this area.
Q. And you've worked with Exponent scientists in writing or coauthoring papers, such as Bhaskar Gollapudi, correct?
A. That is correct.
Q. And what was your impression or experience with the Exponent scientists?
A. My impression of Bhaskar Gollapudi is he's an excellent genetic toxicology expert. He's brilliant at this area. He understands all the concepts to a

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high level and has applied knowledge of how to apply that in hazard and risk assessment. He's an excellent scientist and seems to be good at applying these concepts in this hazard and risk assessment framework.
And the other authors that we saw on the ethylene oxide publication were very good at -- we were looking at the whole wealth of information on that particular substance and working together. They were amazingly extensive in leaving nothing unturned and analyzing the huge amounts of data together, and they were great as well.
So, you know, I have no issues with them.
Q. Well, to the extent that any of those allegations in that article were true, does any of that relate to you or your 2021 paper at all?
A. Can you repeat the question, please.
Q. To the extent that any of the allegations in that FairWarning document that you were shown yesterday are true, does any

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of that relate to you or your PDE paper?
A. It does not at all from my perspective.
Q. You were also asked a number of questions about disclosure of conflict of interests. Do you recall that as well?
A. I recall that as well.
Q. And I believe you were asked specifically about the Heflich article at Exhibit 10; the first author, White, Exhibit 12; Gollapudi, Exhibit 13; Wheeldon, Exhibit 14; and then the Elder commentary, Exhibit 18.
And do you recall the questions about disclosure of conflict of interest for each of those?
A. I recall extensive discussions and series of questions about those topics, about those publications with conflict of interest being the focus.
Q. Okay. Why did you not disclose a conflict of interest in any of those papers?
A. Because they were not related

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to this publication.
Q. They're not related to your work in this case?
A. They're not related to the work in this case.
Q. Was there a conflict of interest that you failed to disclose?
A. There was not a conflict of interest that I failed to disclose.
Q. Did you disclose in your PDE 2021 paper that you were in the -- that you were a consultant on behalf of pharmaceutical companies?
A. A statement included information that I regard as being specific to address that case, yes.
MS. BOGDAN: Please note my objection to form to the last question. There was a little delay.
BY MS. LOCKARD:
Q. Did you disclose your relationship with the companies in this case for whom you have performed a risk assessment in your 2021 PDE paper?

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A. I did produce a conflict of interest that covers that, my relationship within the conflict of interest statement in that publication, yes.
Q. Did you ever share your draft 2020 PDE paper with Teva or any other manufacturer before submitting it?
A. I did not submit a draft prepublished version to GT and the -- are we defendants? Defendants. But you see from the coauthorship of the publication that there are some pharmaceutical industries included as authors who would have seen the draft because they helped to write it.
Q. Did anyone at GT or Teva or on behalf of any other manufacturer provide input into what should go into your PDE 2021 paper?
A. They did not provide that information at all.
Q. You were asked questions about your PDE approach and the comparison of it to the AI approach that was adopted by FDA.
Do you remember answering those

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questions?
A. I remember answering those questions, and the PDEs discussed were almost entirely from the publication and not from my report, and I tried to answer by bringing in the PDEs and the confidence intervals and different calculations for a 100-kilogram human into my answers.
Q. Well, let's -- I believe we marked your report as an exhibit in this case?
TRIAL TECHNICIAN: Exhibit 25 [sic].
MS. LOCKARD: 25. Let's pull that up.
THE STENOGRAPHER: I'm tracking that as Exhibit 2, not 25.
MS. LOCKARD: Oh. Who said 25?
TRIAL TECHNICIAN: That's my internal number, my apologies. Yes, it's marked as Exhibit 2.
BY MS. LOCKARD:
Q. Okay. So if we look at Exhibit 2, you were being questioned about

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the weights that you applied and the ultimate calculations that you rendered in your 2021 paper.
And when you were asked about your paper, the questions primarily surrounded the PDE that you generated for -- in the paper for patients who were at or around 50 kilograms. Is that right?
A. That is how I interpreted the question, with focus on my publication, not on my report.
Q. So if you look at your report, you have a different weight, upper weight limit that you've taken into account in this risk assessment; is that fair?
A. That is fair.
MS. BOGDAN: Objection to the form.
BY MS. LOCKARD:
Q. Where is it demonstrated in your report? What page are you on?
A. Page 60 is where there's an explanation around this 100-kilogram calculation as well. Page 60 of my report.

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Q. Okay. Can you explain for the record what and why you added the 100-kilogram factor into your report in this case when it was not in your 2021 paper?
A. The average population weight in America and for Europe as well is not 50. So if we're looking to use an applicable human weight, such as inline with something like the CDC, which puts forward the population weights, and considering further details as well that I've requested, actually, from GT, the 100-kilogram would be much more applicable to the population exposed in this incidence, and as discussed and looked into, when requested, I think -- they call it a bellwether --
Q. Okay.
A. -- correct? When I requested for details of actual weight of some people exposed, and we did a calculation, looked at it, 100 kilograms was much more in line with this population.
Q. And so you're familiar with the Centers For Disease Control or the CDC here

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in the -- or in the United States?
A. Yes, I am.
Q. Are you aware that CDC publishes tables listing the mean weights for females and males in the U.S.?
A. I am fully aware of that and I have seen it. I used that for my interpretations.
MS. LOCKARD: Let's have that marked as well as the next exhibit, 38.
THE STENOGRAPHER: 39.
MS. LOCKARD: 39. I was led astray.
MR. HARKINS: Victoria, this is the bellwether weights?
MS. LOCKARD: No, this is the CDC. Do you have that to pull up?
MR. HARKINS: I do not.
MS. LOCKARD: Okay. Well, that's okay. I've got a copy of it. We'll come back to that. I've got a copy of it downstairs. Okay.
(Whereupon, Deposition Exhibit

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Johnson-39, USFDA Anthropometric Reference Data for Children and Adults: United States, 2015–2018, was marked for identification.)
BY MS. LOCKARD:
Q. But your understanding is so there is data that is publicly available from the CDC, which you reviewed as to weight. You described that, and you were describing in addition, you reviewed some specific information about valsartan plaintiffs involving their weights; is that correct?
A. Both of those statements are correct.
MS. LOCKARD: Okay. So we'll make -- we'll leave the CDC as the last exhibit, even though we'll mark it, the actual document, later.
And the next exhibit will be what I'm handing the witness now, and, Mr. Harkins, you can pull that up on the screen.
MR. HARKINS: This will be 201 from our internal tracking, and if you

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could please screen-share.
(Whereupon, Deposition Exhibit Johnson-40, Valsartan Bellwether Plaintiffs' Weights, was marked for identification.)
BY MS. LOCKARD:
Q. And is this a document that you worked on with GT?
A. This is a document that I requested for me to investigate and to allow me to assess my PDEs to this population, and that was linked and with GT.
Q. And is -- what is your understanding of what is reflected in this chart that is supportive of your conclusions in your report?
A. My assumption that the average weight of the population that we would be considering would be closer to 150, and if we look at the averages at the bottom, they are all 97 with decimal places, okay? At the bottom, the average, the median and the midpoint are all closer to 100 than they are to 50, and I thought this was an interesting

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and useful bit of information.
Q. So you -- why did you not -- why did you include the 100-kilogram input into your risk assessment here, but not into your 2021 PDE publication?
A. Into the PDE publication, those calculations for regulatory limit would be based on 50 kilograms to cover the whole global population when we don't have information about individual body weights and we don't have a focused population.
And there's two reasons I included it here, one, to show what the PDEs and the concentrations where there would be no levels of increased risk of cancer, and around these concentrations for 50 and 100, and also to show conceptually that this calculation can be tailored towards different populations and even individuals as well. I wanted to get this written in a clear way.
Q. Are your conclusions in this report regarding the levels you've calculated for 100-kilogram patients, is that consistent with your conclusions in the publication with

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regard to 50-kilogram patients in terms of your methodology?

A. In terms of my methodology, calculations are very similar. Apart -- there's the differences that I've put forward are the 100 kilograms. Another difference in the report is around the confidence intervals.

The things with confidence intervals in benchmark dose and with any level of human risk, if you have a single data point, there's no measure of precision, there's no measure of uncertainty.

Recommended for myself and other experts, particularly from the BMD field, you should present both metrics. This covers precision and uncertainty.

And there's been statements from such experts that if you base it on a single data point, such as with the TD50, single data point, no measure of uncertainty and so on, those results are actually meaningless. And that's a direct quote from Wout Slob on this particular topic.

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So I presented those, the confidence intervals, lower and upper bound from the BMD, calculated the PDE, lower and upper confidence intervals. So that was an update and something of interest here.

And another step as well that we could go towards with a population that we know a bit more about is the composite uncertainty factors. We think the cancer -- one of the composite uncertainty factors is 10; one of those 10 counts for heterogeneity of the population for DNA repair.

So unless we can prove the individual has not got MGMT deficiency, that provides me confidence that that 10 can be reduced to a zero, and then that composite uncertainty factor reduces from 500 to 50, and that directly means that our PDE limits were increased actually by an order of magnitude, so multiplied by ten in this instance.

So I hope that explains the detail of this, the extra information in this, and that this is a very tailored

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approach that can be further tailored to ensure that the exposed population aren't at increased risk, and I'm confident in saying that they are not at increased risk in the exposures that I've seen.

Q. You mentioned an MGMT deficiency. Are you comfortable in your assumptions that none of the plaintiffs that you've reviewed in that weight chart have an MGMT deficiency?

A. I -- it's a prediction. MGMT deficiency is very rare and very lethal, and to get to any age of adulthood with MGMT deficiency is very unlikely.

We include that in a global population with the generic PDE because we have to make an assumption, but in a more tailored population that we can actually follow and have a look, I'm comfortable that you can move this -- that you could make that distinguishment between 10 and 1 for that -- to cover that.

Q. One of the -- one of the criticisms I think you mentioned of the FDA's

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approach -- approach or using the TD50 was that it doesn't take into account endogenous sources. Can you explain that?

A. With the TD50, it's a calculation of high-dose -- at a high-dose, high-response part of the dose-response curve. 50% of the animals in that example got cancer, way far beyond the background level.

And then there's a straight line that's drawn back to calculate 1-in-100 risk in animals -- not humans, but they say it's humans -- so 1 in 100,000. So a straight line back to that.

There's no account for endogenous levels really in that straight line from the middle of the high-dose level back to -- back to zero.

With another approach with the dose-response modeling such as BMD, we're including the dose-response information in the low-dose region around the points of departure to which we're discussing background levels with -- we're discussing

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those, we're analyzing it around that low-dose region, which to my understanding has a better reflection on the background and endogenous sources of such DNA damage, and also when you apply the PDE approach on top of this, I think it just better reflects a more precise measure that would better encompass that inclusion of endogenous sources.

Q. Does the AI methodology consider DNA repair?

A. It completely ignores DNA repair in a very -- it really ignores the DNA repair and draws a straight line from the high-dose, high-response part of the dose-response curve, ignoring any information below that by drawing a straight line from there back to the origin, ignoring what the dose-response curve actually looks like.

And that part of the dose-response curve is where we can characterize and show and have shown that DNA repair contributes to that low-dose level where not much is going on, and that's why we

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can justify that DNA repair can support a threshold mechanism, can support a nonlinear dose response, and the linear back-extrapolation does not remotely consider that information.

Q. Did the FDA ever reject your PDA model -- excuse me, PDE model?

A. The decisions made by FDA were made prior to my publication, so they would not have been that time frame.

Q. And the guideline that you were shown from today that was made an exhibit, do you recall that the timeline of that publication was February 2021?

A. That sounds like a correct date. I can see.

Q. How many months before that was your publication of your paper?

A. My publication was in May 11th, 2021.

Q. So given your -- the relationship that you have with HESI and interactions with regulators, industry and other scientists like yourself, do you have a

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sense of why FDA and EMA did not immediately adopt your PDE approach?

MS. BOGDAN: Objection to the form, speculative.

A. My opinion is they -- if they were in a reactive situation, the impurities were in the drugs, there were certain patients taking them. They found this out and had to make a decision very, very quickly in a harmonized way that everyone could agree on very, very quickly.

They did that with the TD50 approach. They did that with the acceptable intake based on the back of that in a reactive way that was able to make -- help them make the decision and justify taking the drugs off the market. Okay. That's understood.

And then when the PDE came along, the justification for using it would be on the DNA repair discussion point, and as I've stated, there's interest from the EMA and they're putting the money forward and we're working together to get that DNA repair

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information together in our grant. So maybe not yet.

When we get our information together, there will be a position and consideration to a big extent again for PDE, as far as I'm aware.

BY MS. LOCKARD:

Q. You spoke a little bit early in the deposition about hazard versus risk, and I believe you commented that the IARC model had moved away from a risk-based to a hazard-based approach. Is that -- is that what you testified to?

A. That is what I testified to, and I would -- I stick to that testimony as well. The IARC, from my understanding and also from my understanding of their recent change in name to recognize this, is they've changed and acknowledged that they're a hazard-based association. And I've seen this in a review article around this topic from leading authors, leading experts in this area.

So I would stand by that and

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say, okay, they are a hazard-based organization. They do base it on classifications, more of yes/no, and also subcategories. They do not talk about concentration; that's risk. They do not talking about concentration. They say something's carcinogenic, it is or is not carcinogenic; that's hazard. Where they classify something as carcinogenic, something is probably carcinogenic; that's hazard.

We're talking about risk. We're talking about concentrations. We're talking about exposure limits of the human population at levels below these are confident that we've shown that they do not have increased risk. That's risk.

Q. You mentioned a paper -- who is one of the authors that you're referring to?

A. I forget the first author, but I'm aware that Alan Boobis is one of the coauthors. I know of his work very well. I think he still chairs the Committee of Carcinogenicity in the U.K. He's also writing a document in line with much of this

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work, actually, for environmental exposures for the WHO.

Another coauthor, I think, is Rita Schoeny, who was actually on the HESI GTTC with us, and she represented EPA at that time. And now she is -- I think she's retired, probably retired, unlike many scientists in this sort of area who keep going. And some other authors.

So yes, those two highlights for us to be able to get that publication would be Alan Boobis and Rita Schoeny, and it really explains very nicely the difference between hazard and risk, and also states quite clearly what the definitions around IARC actually are and to point directly that they're hazard and they do not talk about risk around concentrations.

Q. Is the paper you're referring to the Codification of Hazard and Its Impact on the Hazard Versus Risk Controversy, John Doe -- John Doe being the first author?

A. That is the correct paper.

Q. And Alan Boobies.

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A. No, not Boobies. Boobis.

Q. Oh, excuse me.

And Rita Schoeny is on here. But this is the paper you were referencing?

A. That is the paper. And many of the other coauthors are incredible, including Sam Cohen.

MS. LOCKARD: Can we get this pulled up as an exhibit, please, as the next exhibit?

MR. HARKINS: Chris, this will be 210 from our internal tracking, introduced as Exhibit 41.

(Whereupon, Deposition Exhibit Johnson-41, The codification of hazard and its impact on the hazard versus risk controversy, by Doe et al, was marked for identification.)

BY MS. LOCKARD:

Q. So in the introduction section of this, if you can just pull that up on the screen, right there -- right there. So at the very bottom, it says: There has been a long-running controversy about the relative

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merits of hazard-based versus risk-based approaches in managing the potential harm -- the potential for harm to human health from the use of chemicals.

Do you agree with that?

A. I fully agree with that, and that's a very nice statement.

Q. It goes on to say, page 2, probably about six lines -- five or six lines down -- it says: This can result in inappropriate levels of concern, either too much or too little, over some chemicals due to factors such as perception of no choice in exposure, poorly understood technical issues such as dose response, unfamiliarity with uses and benefits, and political desire to ban or to keep in use.

Do you agree with that?

A. I entirely agree with that. And going with just a hazard-based assessment for regulating substances is absurd. To say in coffee there's 21 known carcinogens. Do we ban coffee? No. We figure out that they're low concentrations, they're of

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negligible concern.
We ban -- if we say something is a carcinogen -- IARC came out and said meat was a carcinogen. Do we ban meat? No. We start -- we go towards levels of risk. That's what we do.
We've got to get towards dose response. We've got to get towards concentrations. We've got to get towards risk-based approaches.
And this is why experts such as this need to put these publications out there, to really inform everyone and educate everyone. The media don't understand this. And this is why one week they'll say this gives you cancer, gets everyone scared.
We don't need to go along those lines. We talk about dose. We talk about risk. And it's a big deal. We need to start talking about risk and move away from that hazard-based binary classification or subclassifications, as in IARC.
Q. And is IARC making that movement away from the binary towards a

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dose-based assessment, or is it still binary?
A. As far as I'm aware, it's -- it's not so binary, because they've got four different options, but it's still classifications of hazard, definitely hazard. They do not talk about risk assessment levels. They're a hazard-based organization as reflected by their recent acknowledgement in this, that's also stated in this publication.
Q. Is that on page -- if we could -- well, it's not -- I guess keep moving forward --
A. I think it's like page 4 or 5, maybe.
Q. -- to the section on carcinogenicity. There you go. Yeah.
So is this the section that you're referring to, Dr. Johnson, regarding the IARC?
A. Yes. This is a very nice --
Q. What is this --
A. -- clear statement.
Q. What are they saying in this

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statement?
MS. BOGDAN: Objection to form, speculative.
BY MS. LOCKARD:
Q. What do you understand this passage to mean --
A. I'm looking at the Zoom. Can I see the whole Zoom? Keep going.
THE WITNESS: Apologies, Victoria.
I can't control the Zoom. I can't see the whole thing.
MS. LOCKARD: Can I just give you a copy?
THE WITNESS: Yeah, thank you. Great, thank you.
A. My interpretation of this highlighted section within this excellent publication, around IARC. Statement: In fact, IARC's grouping is based on the strength of evidence as to whether a hazard is possible, not to the degree of hazard.
This is a statement associated with IARC 2019 as well. We see these

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classifications, which have come up regularly in our discussions, around these different hazard-based categories for carcinogens. Group 1, Group 2A, Group 2B, Group 3.
The next bit: The assessment is at Level 1, and this has been confirmed in the change to the name of the IARC monograph program in 2019, when Evaluation of Carcinogenic Risks -- because it wasn't risks -- became Identification of Carcinogenic Hazards -- because it's hazards, as I've stated.
IARC emphasizes the point that they are operating Level 1 hazard codification: The categories of the classification refer to the strength of the evidence that an exposure is carcinogenic -- it is carcinogenic and not to the risk of cancer from that particular exposure.
They don't talk about dose, they don't talk about exposures, they don't talk about risk.
The terms "probably carcinogenic" and "possibly carcinogenic"

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have no quantitative significance -- no quantitative significance -- and are used as descriptors of different strengths of evidence of carcinogenicity in humans; "probably carcinogenic" signifies a greater strength of evidence, and so on.

So clearly stating here, which no one who understands this would disagree with, it's a hazard-based organization that does not talk about dose, does not talk about risk. And I wanted to make that clear.

Q. Do you understand the meaning of the phrase "general causation" in the context of this case?

MS. BOGDAN: Objection to the form, calls for a legal conclusion.

BY MS. LOCKARD:

Q. Do you understand, Dr. Johnson, that you've been identified as an expert on behalf of the defendants to provide general causation opinions?

A. I have been made aware of that by GT.

Q. Yes. And what -- if you could

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encapsulate your opinion for us today succinctly, what is your ultimate conclusion with respect to the question of general causation in this case?

A. My conclusion --

MS. BOGDAN: Objection to the form.

A. My conclusion is that the individuals exposed to the levels of NDMA and NDEA that I've seen in these -- as impurities in these particular drugs does not cause increased risk to these exposed populations. That's my statement on that.

BY MS. LOCKARD:

Q. You've seen corporate documents reflecting levels of nitrosamine impurities in the products that are higher than the FDA chart; is that -- did you testify to that earlier?

Let me ask it this way: Have you seen corporate documents showing the finished dose and API testing in this case from the corporate defendants?

A. I have seen that information in

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lots of detail and discussed it as well as seeing it with those defendants too.

Q. And in looking at those levels that were provided by the corporate defendants, despite some of them potentially being higher than levels reported by the FDA, did that change your opinion with respect to causation in your PDE calculation in this case?

MS. BOGDAN: Objection to the form.

A. It did not change my opinion about my conclusions, as just stated, in this case.

BY MS. LOCKARD:

Q. And you were shown an EMA document today that included testing from products sold in Europe.

Do you recall seeing that document?

A. From EMA?

Q. Let's see if we can pull it up.

A. Apologies, can you repeat the question?

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Q. I was trying to reference back to the EMA document that counsel showed you that included -- included a chart of levels from --

A. I remember that now. Thank you.

Q. Okay.

A. I remember that.

Q. And you did not include those levels in your risk assessment for this case, did you?

A. I did not include those but I considered them.

Q. But in your -- in performing your risk assessment with respect to this case and the individuals involved, would it have been appropriate for you to base your risk assessment on testing levels for products that were sold in an entirely different country than those at issue in this case?

A. I like to deal with relevance and precision, and you'd need to base your assumptions on the country where those

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products are sold and where that batch has been tested.

And basing that on a different continent where it's different batches, et cetera, different population, we would go with the American numbers, not the EU numbers.

Q. And you have seen American numbers from both the corporate defendants and the FDA; is that true?

A. That is true. The FDA ones are in my report, and from the list, we can see I've looked at and I've also discussed this with the other companies too, through links with GT too. So yes, I'm confident with that.

Q. So when you referenced the other companies, you've had discussions with the lawyers for the companies for which you're serving as an expert, but you haven't spoken directly to industry people at these pharmaceutical companies, have you?

A. That is correct.

Q. And I know there was a lot of

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discussion about how and when you were first retained, but to clarify, when you were first retained in this case as a consultant, that retention came through Greenberg Traurig; is that your recollection?

A. That is my recollection.

Q. So was there ever a time when you were doing independent consultancy or investigative work for Teva when the law firm of GT was not involved?

A. No, it was always with GT.

MS. LOCKARD: Let's get marked the next exhibit, please. We'll get that pulled up on the screen.

(Whereupon, Deposition Exhibit Johnson-42, E-mail(s) re: Snodin & Elder Commentary, TEVA-MDL2875-00425960, was marked for identification.)

THE STENOGRAPHER: It's going to be 42.

MR. HARKINS: Chris, this will be 204 on our internal tracking.

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BY MS. LOCKARD:

Q. Do you recall being asked questions by counsel about an e-mail exchange wherein Dr. Nudelman sent you a document and said to find enclosed a new commentary from Snodin and Elder?

Do you remember that e-mail?

A. I do remember we discussed that yesterday.

Q. And that -- the e-mail that you were asked to speculate about what you would have put in your response to Dr. Nudelman, do you recall that?

A. It was along the lines of thank you for the paper.

Q. Okay. And I'm going to show you what's been marked as the next exhibit in line, and if you'll take a look at it.

MS. LOCKARD: This is now an unredacted version, which I've had my team look at the document that was produced, and I'm unsure why it was redacted, but it is now -- we have dedesignated it as a redacted

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document. It's not privileged, and it's not confidential, so we've dedesignated on both sides.

BY MS. LOCKARD:

Q. But you haven't seen this -- I haven't shown you this, have I?

A. No, I saw it yesterday with redacted written on it, I think, as far as I can recall.

Q. And this is -- is this the first time you're seeing your actual words since you wrote it?

A. Since -- yeah.

Q. Okay. So can you just read into the record, what did you, in fact, say to Dr. Nudelman after he sent you that attachment?

A. I responded after I had been passed on the paper, Snodin & Elder Commentary: Hi, Raphy. Thank you for this. Best wishes, George.

Succinct, maybe impolite, but that's my response.

MS. LOCKARD: I wanted to have

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marked the Defendants' Responses and Objections to Plaintiffs' Notice of Videotaped Deposition.

MR. HARKINS: Chris, this will be 200 on the internal tracking.

(Whereupon, Deposition Exhibit Johnson-43, Defendants' Responses and Objections to Plaintiffs' Notice of Videotaped Deposition of George Johnson, Ph.D., was marked for identification.)

MS. LOCKARD: That's just for the record.

BY MS. LOCKARD:

Q. We've been discussing that -- that the ICH MC -- excuse me, the ICH M7 provides for both options, doing the TD50 or a PDE; is that correct?

A. Yes, that is correct.

Q. Do you have a copy of -- actually, I think this is your copy.

MS. LOCKARD: So, Steve, can we bring up the ICH M7(R1) as the next exhibit in line?

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MR. HARKINS: Chris, that will be 209 from the internal tracking. If you can please screen-share.

(Whereupon, Deposition Exhibit Johnson-44, ICH Guideline, Assessment and Control of DNA Reactive (Mutagenic) Impurities in Pharmaceuticals to Limit Potential Carcinogenic Risk M7(R1), was marked for identification.)

BY MS. LOCKARD:

Q. Can you identify for us, Dr. Johnson, where in the ICH guideline it addresses the PDE as being an acceptable approach?

A. I think it's best explained on page 35, Section 3, Nonlinear, brackets, Threshold, Mode of Action and Calculation of PDE.

Q. So that is the section you're referring to, 35, page 35?

A. Page 35, about halfway down. The Zoom has not moved on yet.

TRIAL TECHNICIAN: Hang on one second.

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BY MS. LOCKARD:

Q. Okay. And what -- you know, for purposes of this case, what does this section tell us about the acceptability of the use of a PDE?

A. I would like to read this section to ensure precision.

The existence of mechanisms leading to a dose response that is nonlinear or has the -- or has a practical threshold --

(Audio malfunction.)

A. The existence of mechanisms leading to a dose response that is nonlinear or has a practical threshold is increasingly recognized, not only for compounds that interact with non-DNA targets but also for DNA-reactive compounds.

For the record, in addition to this, that includes the compounds we're talking about today.

Keep reading: whose effects may be modulated by, for example, rapid detoxification before coming into contact

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with DNA, or by effective repair of induced damage.

This statement is very important for us. And then: The regulatory approach to such compounds can be based on the identification of a No-Observed Effect Level -- notes that the BMD is equivalent to the No-Observed Effect Level -- and use of uncertainty factors, which we talked about a lot, to calculate a permissible daily exposure, a PDE.

This directly says if you can understand the dose response, can show nonlinearity or practical threshold, and you can show that DNA repair is the mechanism, then you can use a PDE.

Q. Thank you, Doctor.

A. An extension to that, the next statement links entirely to my impact story on EMS. An example of a DNA -- so the example they use here: The example of a DNA-reactive chemical for which a threshold has been proposed for mutagenicity in vitro and in vitro is ethyl methanesulfonate. A

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PDE calculation using uncertainty factors, instead of a linear extrapolation, is appropriate in such cases where a threshold -- and then a definition of threshold with mechanism above -- where a threshold has been established.

This is entirely what I'm talking about and is in the ICH M7 guidance. Thank you.

An extension -- do I need to explain what the ICH is?

Q. No, that's okay. I think we get the point. I appreciate it, though.

MS. LOCKARD: Let's just take a break. I think we've been going for a while. And I'll have a few more questions after that, but I should be getting close to done.

THE VIDEOGRAPHER: Going off the record. The time is 2:32 p.m.

(Recess taken, 2:32 p.m. to 2:43 p.m. BST)

THE VIDEOGRAPHER: We're back on the record. The time is 2:43 p.m.

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MS. LOCKARD: Okay. So I'd like to get marked as the next exhibit in line. It's just the -- it's a Second Amended List of Materials, for the record, which has the addition of the Chart of Weights and the CDC publicly available data that he had looked at online.

(Whereupon, Deposition Exhibit Johnson-45, Johnson Second Amended List of Materials Considered, was marked for identification.)

MS. LOCKARD: So I'll mark this second exhibit -- excuse me -- Second Amended List of Materials Considered as the next exhibit. And what number was that?

THE STENOGRAPHER: 45.

MS. LOCKARD: 45.

So then for 46, I have a USB that contains everything that is on the Second Amended List of Materials Considered, including the weights chart and the CDC materials. So I'll

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mark the -- the thumb drive as Exhibit 46.

(Whereupon, Deposition Exhibit Johnson-46, USB Drive of Documents Considered [Physical Exhibit], was marked for identification.)

MS. LOCKARD: And I can give that to the court reporter after Zoom -- the videographer. Okay.

At this time, I don't have any further questions, so I turn the witness back over to plaintiffs' counsel.

MS. GOLDENBERG: Victoria, just because I saw the videographer shake his head, I don't think we can give him exhibits. Is there a way to get that to --

MS. LOCKARD: Do you want to take it or --

(Interruption by the stenographer.)

(Technical comments off the stenographic record.)

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MS. LOCKARD: Okay. Thank you, Dr. Johnson.

THE WITNESS: Thank you.

MS. BOGDAN: I'm going to take just 10 minutes. Thank you.

MS. LOCKARD: Okay.

THE VIDEOGRAPHER: Going off the record. The time is 2:45 p.m.

(Recess taken, 2:45 p.m. to 2:59 p.m. BST)

THE VIDEOGRAPHER: Back on the record. The time is 2:59 p.m.

EXAMINATION

BY MS. BOGDAN:

Q. Hi, Doctor. I have some follow-up questions for you based upon your testimony that you just provided.

Do you recall telling the defendants' lawyer that your mom took valsartan?

A. Yes, that's a correct statement for myself.

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Q. Do you know whether your mom was taking contaminated valsartan?
A. I do not know which version of valsartan she did. She would take them and throw the box away, and she was moved to a different drug. And when I talked to her, she had no boxes or recollection of which one.
Q. Now, when you say she was moved to a different drug, was that in response to the valsartan recall?
A. As far as I understand, yes.
Q. And how much NDMA or NDEA was in the valsartan that your mom took?
A. I do not know.
MS. LOCKARD: Objection, form, speculation.
A. I do not know.
BY MS. BOGDAN:
Q. And you do not know the manufacturer of the valsartan that your mom did take?
A. That is correct, I do not know.
Q. So you never attempted to order

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her pharmacy records to figure out who manufactured the valsartan that your mother took?
MS. LOCKARD: I'm going to object to the extent that we're getting into any sort of -- it's not HIPAA protected, but in the European Union, the privacy restrictions are very strict.
And if you want to make the record with your questions, but I'm uncomfortable with him answering questions about his mother's health and pharmacy records.
MS. BOGDAN: Well, he is the one that brought it up in his redirect testimony, and I'm not asking about what the records say.
What I'm asking is if he took the steps to get his mother's pharmacy records and review them, not what they say. It's if he actually took that action himself. That is the question on the table.

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MS. LOCKARD: I'll allow that.
You can answer.
THE WITNESS: Okay.
A. I did not take those steps to get the pharmacy records of which batches and so on or producers of valsartan she was taking because I was comfortable that she had no increased risk of cancer, so I did not perform that action.
BY MS. BOGDAN:
Q. Now, in response to the defense lawyer's questions, you spoke a little bit about DNA repair.
DNA repair genes frequently express reduced levels of repair proteins due to epigenetic repression, correct?
A. Certain DNA repair genes would have different levels for -- and epigenetic modifications could be one such mechanism for reducing their levels, correct.
Q. This can lead to increased DNA damage, correct?
A. Depending on which DNA repair enzyme was being modified, some would be

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correct, some would have less influence.
Q. And increased DNA damage can lead to increased mutations, correct?
A. Increased DNA damage can lead to increased mutations.
Q. The epigenetic repression or DNA gene expression is also frequent in the field defects that surround and give rise to cancer, correct? Let me rephrase that.
The epigenetic repression or DNA repair gene expression is also frequent in the field defects that surround and give rise to cancer, correct?
A. It could be one characteristic of a cancer, to have different levels of DNA repair, with potentially epigenetics being one such modification of a DNA repair enzyme.
Q. And people inherit mutations in DNA repair genes, correct?
MS. LOCKARD: Objection, vague.
A. People can inherit certain modifications in certain DNA repair genes, unless that modification leads to their death before they produce a child, if it's a very

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severe and important DNA repair gene.
BY MS. BOGDAN:
Q. MGMT expression can be reduced due to methylation of the MGMT promoter region, correct?
A. MGMT can be reduced by methylation of the promoter region, so reduction is different to being knockout and not being existent, which is what I was discussing with that adjustment factor of not being there compared to lower amounts of that DNA repair enzyme.
Q. And isn't it true that 40 to 90% of colorectal cancers have reduced MGMT repression due to methylation of the MGMT promoter region?
A. I'm unaware of that information.
Q. And out of the millions of users of valsartan, was it your testimony that none of them have MGMT deficiency?
MS. LOCKARD: Object to form.
A. My comment around this topic was a small proportion of people that we

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could potentially investigate that would be linked to this particular case. Within that small population, the probability of someone having no MGMT at all would be highly unlikely.
BY MS. BOGDAN:
Q. And so you were referring to no MGMT --
(Clarification requested by the stenographer.)
BY MS. BOGDAN:
Q. -- in your previous testimony?
A. In my previous testimony, I was referring to no, so absent or -- yeah, so absent DNA repair, specifically MGMT, and the reason why I stated that exactly is because in that White, et al paper where we looked at the difference that knockout, so absence of MGMT, had on the influence of toxic and genotoxic effect was within this factor of 10. So even full absence of DNA repair, specifically MGMT, the maximum response we could see was around 10, and anything beyond that means that that factor should be --

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could be reduced from that number of 10. So that's what I was referring to.
Q. So you acknowledge that patients can have a reduced MGMT expression due to methylation of the MGMT in the promoter region, correct?
A. I accept that that is a possibility, correct.
Q. And you haven't reviewed all of the plaintiffs' medical records in this litigation, correct?
A. I have not reviewed all of the patients' medical records. That is definitely correct.
Q. So you wouldn't know whether any of the plaintiffs actually have MGMT deficiency, correct?
A. I would not know that, and that would be an assumption. Hence, when I discussed it, it was presented as an assumption.
Q. Now, I believe Exhibit 44 that you were shown, which was the ICH M7 guidance, has a date on it of March of 2017?

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A. Are we getting this up on the screen?
TRIAL TECHNICIAN: Yes.
BY MS. BOGDAN:
Q. Isn't that correct?
A. Can we put it as an exhibit as well, please, and to keep things moving, I can see on the screen that that is correct from 2017, but I'd like to see it in the full format in the exhibit too. This is correct.
TRIAL TECHNICIAN: It's in there as Exhibit 44.
BY MS. BOGDAN:
Q. And this was the document that you referenced with regard to the BMD approach, correct?
A. This was the document that I referred to for the PDE approach.
Q. For the PDE approach. Excuse me. Right.
MS. BOGDAN: So we can take that down.
BY MS. BOGDAN:
Q. And isn't it true that the

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guidance for industry that the FDA in this country published for the control of nitrosamine impurities in human drugs, dated four years later, in February of 2021, elected to follow the linear dose extrapolation method to calculate acceptable intake limits for NDMA and NDEA? Isn't that correct?

MS. LOCKARD: Objection, form.

A. It is correct. Those FDA decisions to calculate an acceptable intake based on a linear back-extrapolation from the harmonic mean of the TD50 for NDMA and NDEA, to calculate those acceptable intakes, so that was dated after this ICH guidance which we were just looking at, ICH M7.

BY MS. BOGDAN:

Q. Would you agree that the United States FDA is responsible for protecting public health?

MS. LOCKARD: Objection, vague.

A. I would accept that that's one of the remits of the FDA, as well as many other regulatory bodies, to protect public

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health.

BY MS. BOGDAN:

Q. And that the FDA has established the acceptable intake limits for NDMA at 96 nanograms per day and NDEA at 26.5 nanograms per day; isn't that correct?

MS. LOCKARD: Objection, asked and answered.

A. I'm aware that the FDA has calculated NDMA acceptable intake based on the linear back-extrapolation from the harmonic mean of the TD50 in liver using a 1-in-100,000 approach with a linear back-extrapolation and no correction from animals to humans, no consideration of DNA repair or dose response to calculate 96 for NDMA and 26.5 acceptable intake for NDEA. I -- yes.

BY MS. BOGDAN:

Q. And isn't it true that the FDA has established 96 nanograms as the acceptable daily limit for NDMA?

MS. LOCKARD: Objection, asked and answered.

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BY MS. BOGDAN:

Q. That's a yes-or-no question.

A. NDMA -- the FDA has produced an acceptable intake based on the linear back-extrapolation from those data, and it is 96 for NDMA. That's the acceptable intake from the FDA using that linear back-extrapolation, correct.

Q. And similarly, the FDA has established the acceptable limit for NDEA at 26.5 nanograms a day?

MS. LOCKARD: Objection, asked and answered.

A. FDA has calculated and presented and published the acceptable intake of 26.5 for NDEA based on the linear back-extrapolation calculation from the harmonic mean of the TD50 using that approach that I've critiqued heavily.

MS. BOGDAN: I don't have any further questions at this time.

MS. LOCKARD: Okay. Quick break.

THE VIDEOGRAPHER: Going off

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the record. The time is 3:15 p.m.

(Recess taken, 3:15 p.m. to 3:19 p.m. BST)

THE VIDEOGRAPHER: Back on the record. The time is 3:19 p.m.

MS. LOCKARD: Okay. I don't have any more questions for you, Dr. Johnson. Thank you very much. I think this means your deposition is concluded.

We previously indicated we would designate the deposition at the end of the 30-day period with respect to confidentiality, and it's deemed under the protective order confidential for the next 30 days until we do so.

THE STENOGRAPHER: Anything else?

MS. LOCKARD: Nope. Thank you.

THE VIDEOGRAPHER: Going off the record. The time is 3:20 p.m.

(Time noted: 3:20 p.m. BST)

--o0o--

CERTIFICATE

I, MICHAEL E. MILLER, Fellow of the Academy of Professional Reporters, Registered Diplomate Reporter, Certified Realtime Reporter, Certified Court Reporter and Notary Public, do hereby certify that prior to the commencement of the examination, GEORGE JOHNSON, Ph.D. was duly sworn by me to testify to the truth, the whole truth and nothing but the truth.

I DO FURTHER CERTIFY that the foregoing is a verbatim transcript of the testimony as taken stenographically by and before me at the time, place and on the date hereinbefore set forth, to the best of my ability.

I DO FURTHER CERTIFY that pursuant to FRCP Rule 30, signature of the witness was not requested by the witness or other party before the conclusion of the deposition.

I DO FURTHER CERTIFY that I am neither a relative nor employee nor attorney nor counsel of any of the parties to this action, and that I am neither a relative nor employee of such attorney or counsel, and that I am not financially interested in the action.

____
MICHAEL E. MILLER, FAPR, RDR, CRR
Fellow of the Academy of Professional Reporters
NCRA Registered Diplomate Reporter
NCRA Certified Realtime Reporter
Certified Court Reporter

New Jersey Certified Court Reporter
No. 30XI00242200
Expires: 6/30/2022

Dated: October 12, 2021

INSTRUCTIONS TO WITNESS

Please read your deposition over carefully and make any necessary corrections. You should state the reason in the appropriate space on the errata sheet for any corrections that are made.

After doing so, please sign the errata sheet and date it.

You are signing same subject to the changes you have noted on the errata sheet, which will be attached to your deposition.

It is imperative that you return the original errata sheet to the deposing attorney within thirty (30) days of receipt of the deposition transcript by you. If you fail to do so, the deposition transcript may be deemed to be accurate and may be used in court.

ERRATA

PAGE LINE CHANGE
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ACKNOWLEDGMENT OF DEPONENT

I, GEORGE JOHNSON, Ph.D., do hereby certify that I have read the foregoing pages and that the same is a correct transcription of the answers given by me to the questions therein propounded, except for the corrections or changes in form or substance, if any, noted in the attached Errata Sheet.

____
GEORGE JOHNSON, Ph.D. DATE

Subscribed and sworn to before me this
_______ day of _______________, 20 _____.
My commission expires: _______________

____
Notary Public

LAWYER'S NOTES

PAGE	LINE	

Errata Sheet

October 4-5, 2021 Deposition Transcript – George Johnson, Ph.D.
In re: Valsartan, Losartan, and Irbesartan Products Liability Litigation

MONDAY 10/4/21

Pages, Lines	Change:	Reason
64:24	Change "test" to "**testing**"	Clarification
83:23	Change "I've" to "**I**"	Clarification
94:10	Change "how it's occurred" to "**how it occurs**"	Clarification
157:23	Change "slide date" to "slide **deck**"	Clarification.
174:13	Change "replied" to "**replying**"	Clarification
192:6-7	"or if, as we predicted, the observed concentration would be below the PDE…"	Clarification
199:23	Change "contour" to "**quantal**"	Transcription error
205:12	Change "covariant" to "**covariate**"	Transcription error
219:17	Change "was" to "**were**"	Transcription error / Correction
258:20	"I did, (as in "what I did was")" – should edit to say, "What I did was, I looked at ….	Transcription error / Correction

TUESDAY 10/5/21

Pages, Lines	Change:	Reason
328:2	Add: "and even then it will not be 100% pure."	Completeness / clarification
340:22	Change "multiples suggested" to read "multiple ***species***" suggested by….	Transcription error / clarification.
351:11-13	Remove names; incorrect recollection, these persons not involved.	Correction
377:11-12	Change "lie to" and make it "**align with**"	Transcription error / correct testimony
379:3	Change "far" to "**for**"	Transcription error / correct testimony
381:6	Insert "**do not**" before have	Transcription error / correct testimony
384:5	Change 1-100 risk to **1-100,000**	Transcription error / correct testimony
384:6	Change 1-100 risk to **1-100,000**	Transcription error / correct testimony
387:1-2	Edit "That's the background" to "**That's the actual background rate of cancer.**"	Completeness and clarification
421:3	Delete "would be"	Correction / Clarification
445:20	Change "antigens" to "**aneugens**"	Transcription error / correct testimony

446:21	Change "vice president" to "**past president**"	Transcription error / correct testimony
460:1	Change "is it shows" to "is **that** it shows"	Clarification
463:12	Strike "I do"	Clarification
492:6	Change "talking" to "**talk**"	clarification
495:21	Change "To say" to "**For example**"	Clarification
507:13	Change "yeah" to "**yes**"	Proper English
518:24	Add comma after "would be**,**"	Clarification on sentence

George Johnson, Ph.D.

K Harris, Notary Public.

This, the 17th day of November, 2021.

My Commission Expires: Kimberly Harris NOTARY PUBLIC Forsyth County, GEORGIA My Commission Expires February 6, 2024.